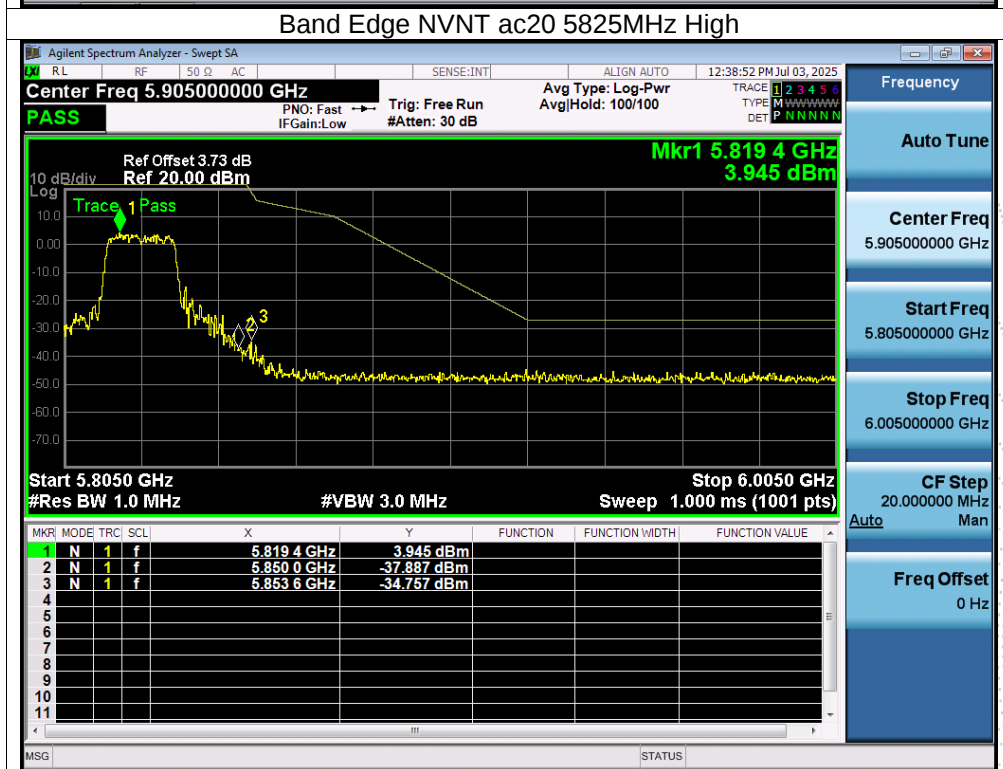
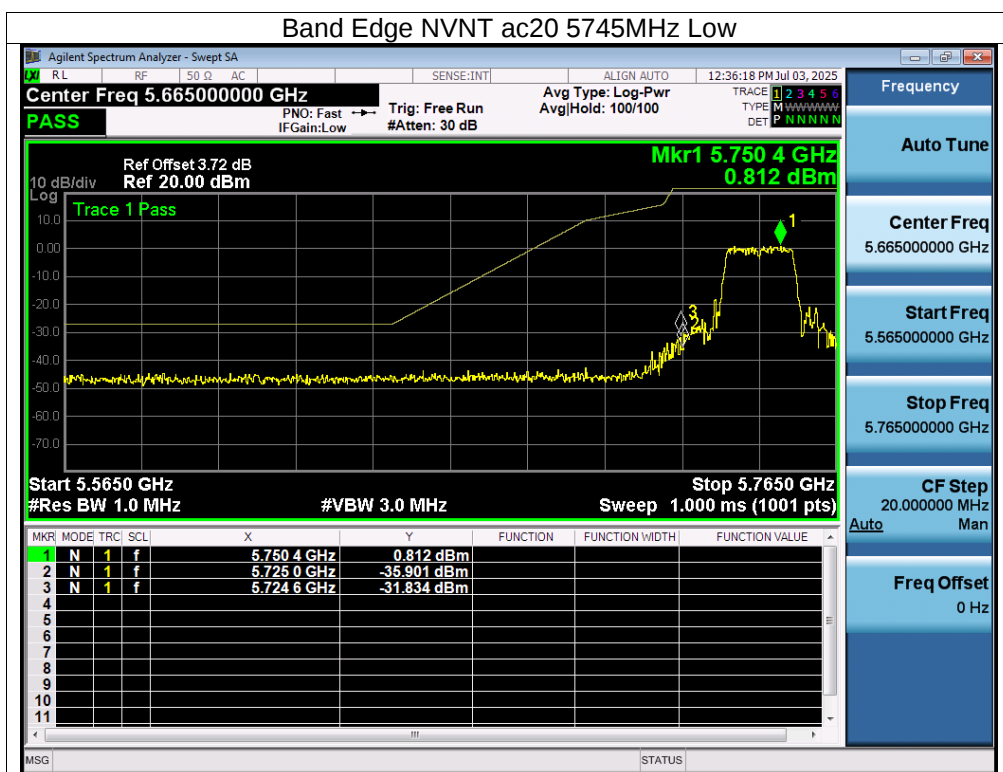
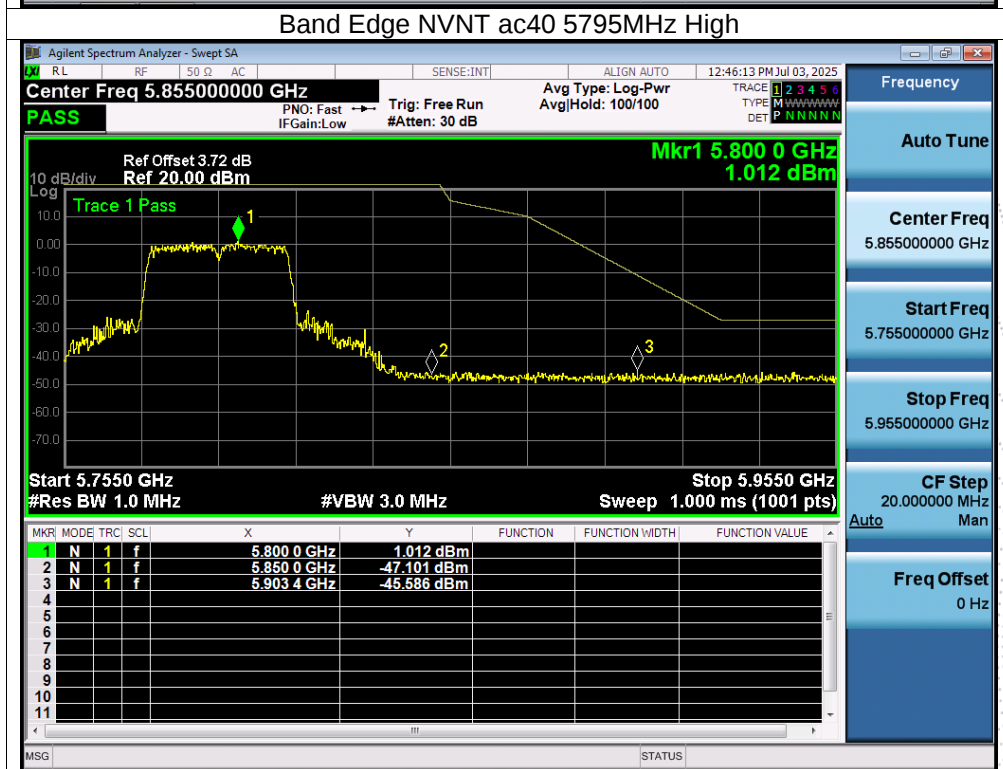
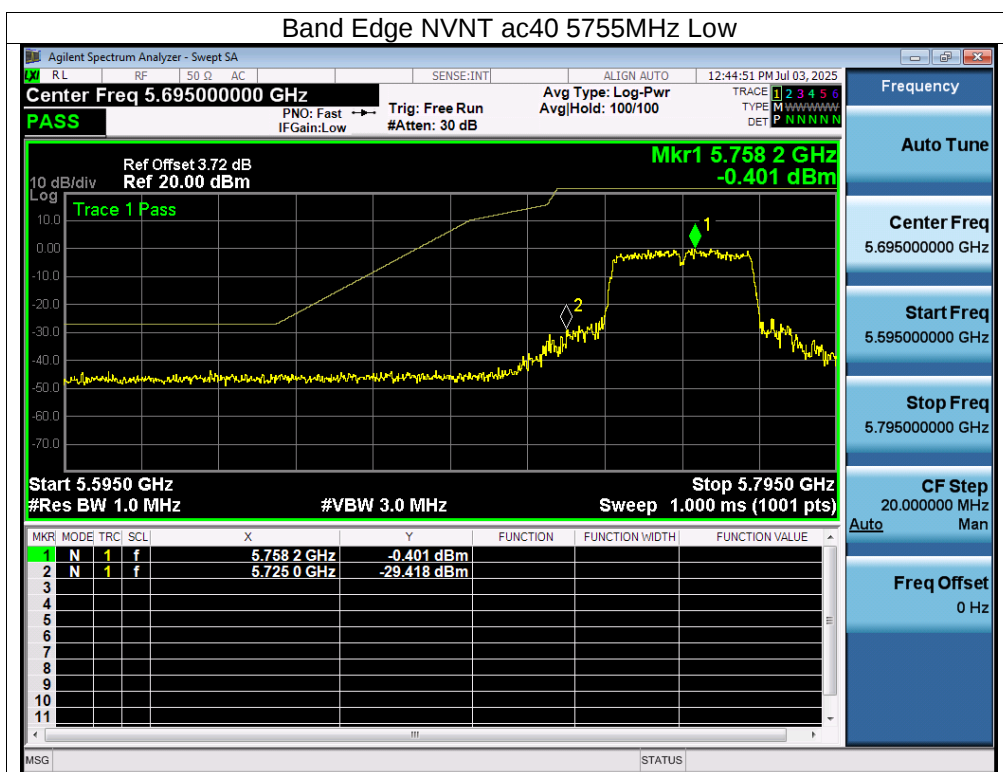
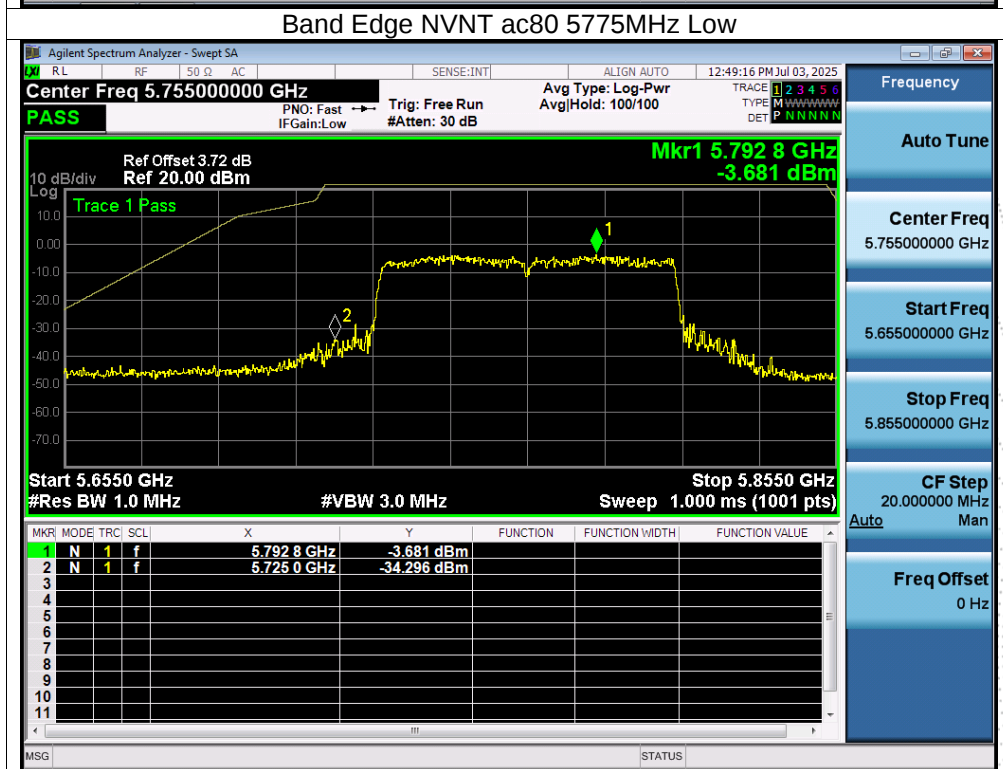
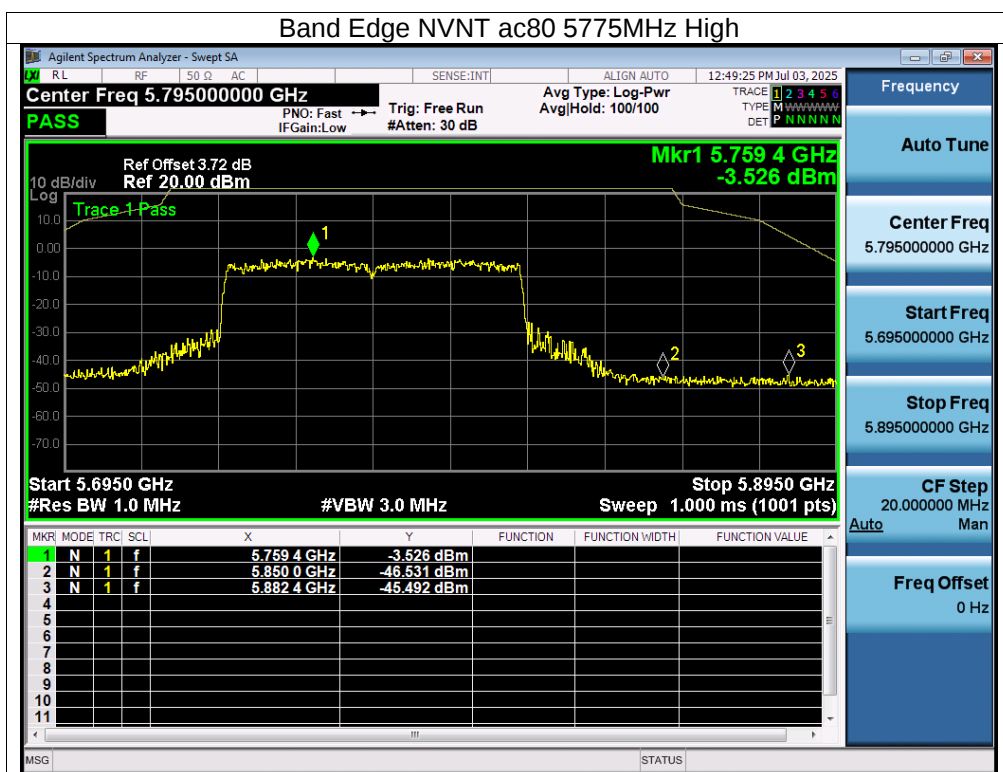








## 12. Spurious RF Conducted Emissions

### 12.1 Block Diagram Of Test Setup



### 12.2 Limit

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of -27 dBm/MHz.

(2) For transmitters operating in the 5.725-5.85 GHz band(i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge..

### 12.3 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

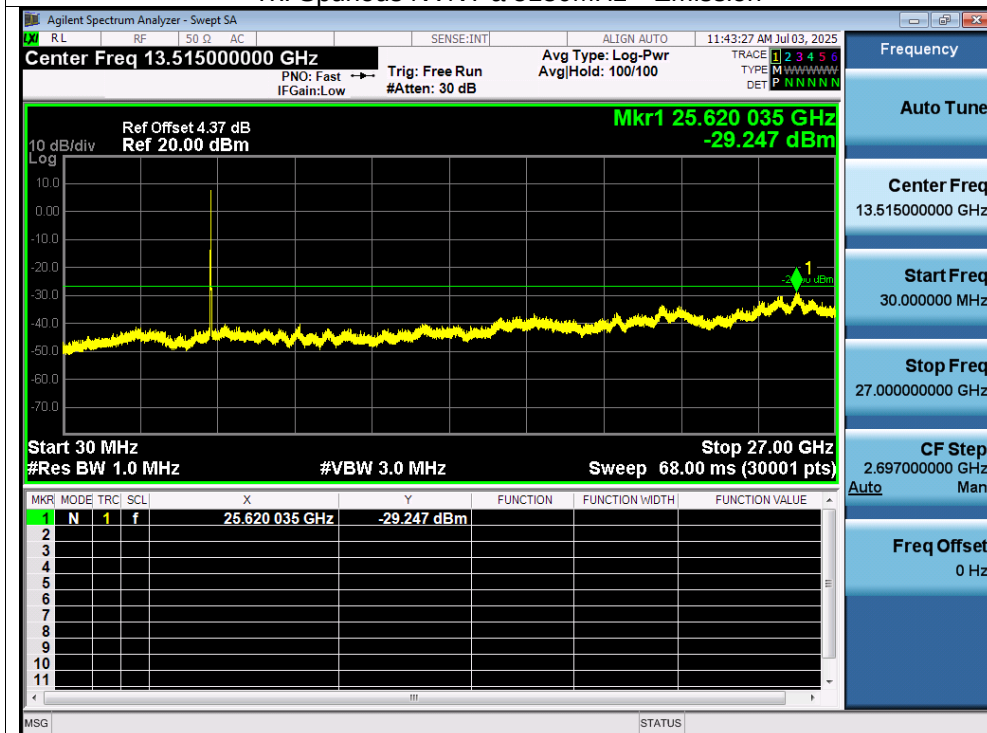
### 12.4 Test Result

Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and band edge measurement data.

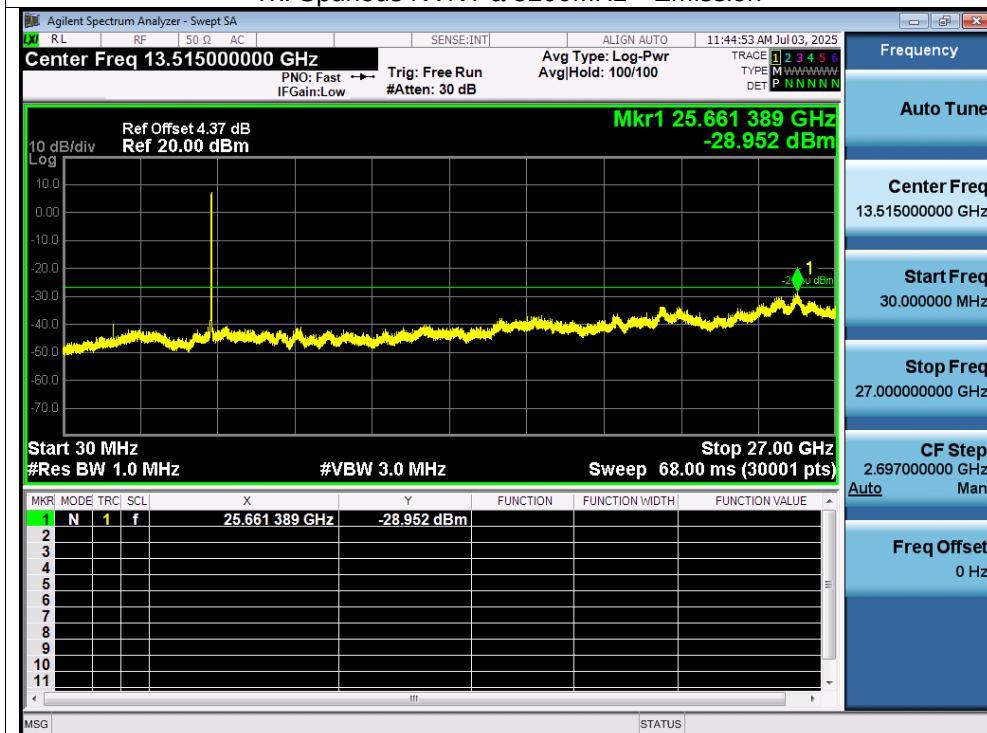
About: 26.5 GHz-40GHz, The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

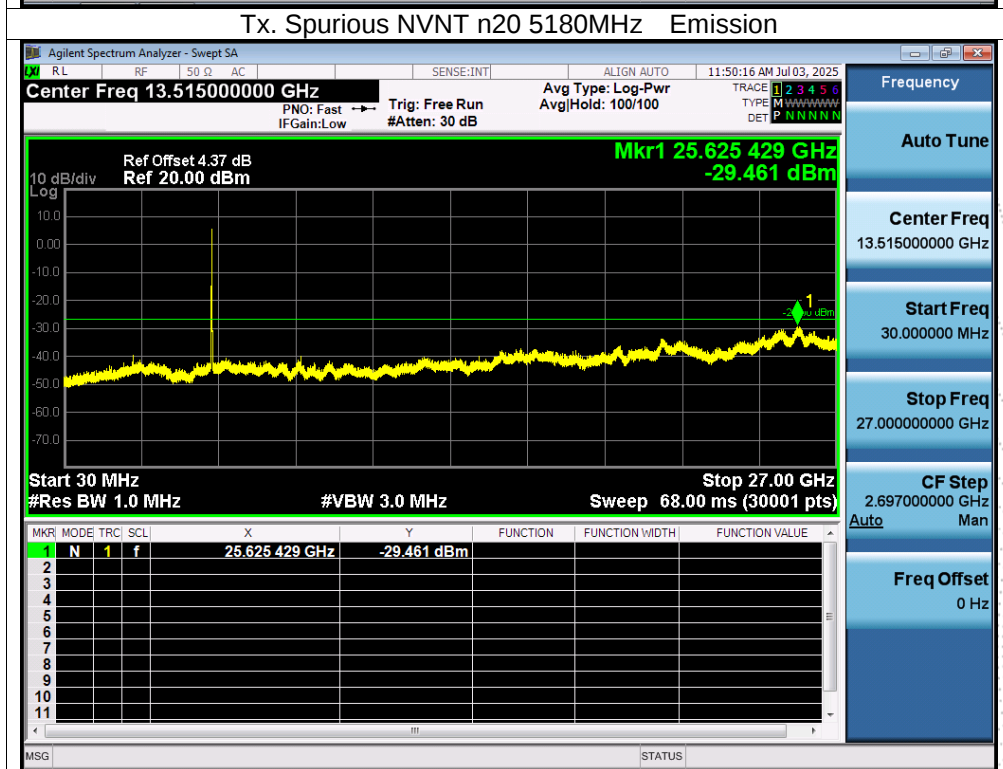
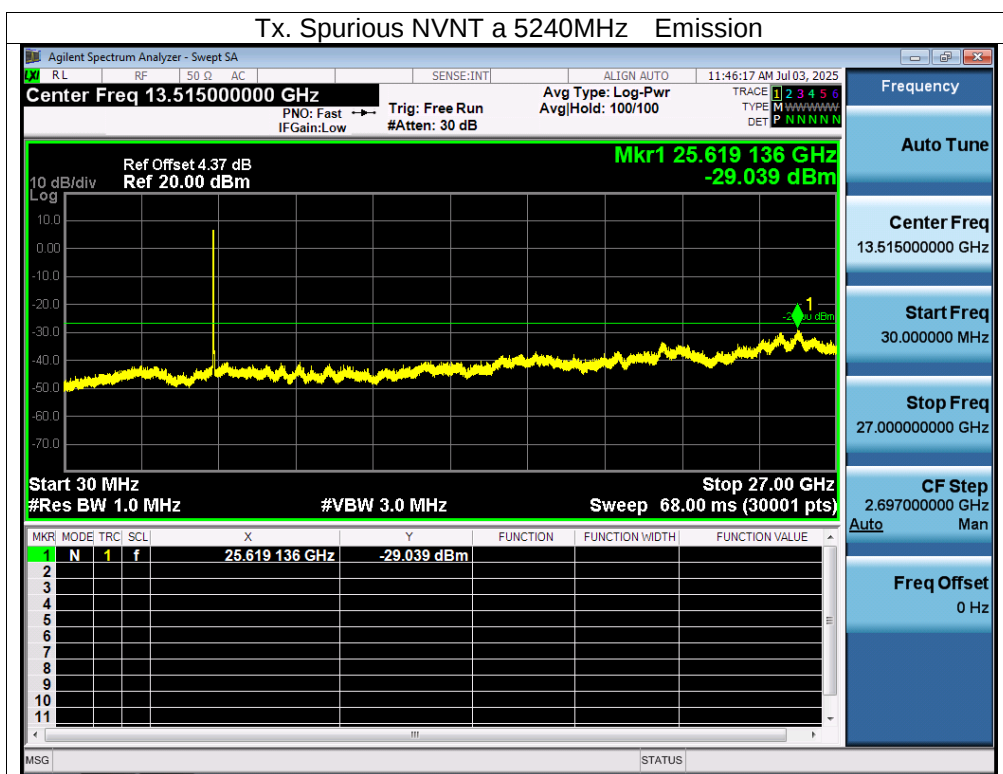
### Test Graphs

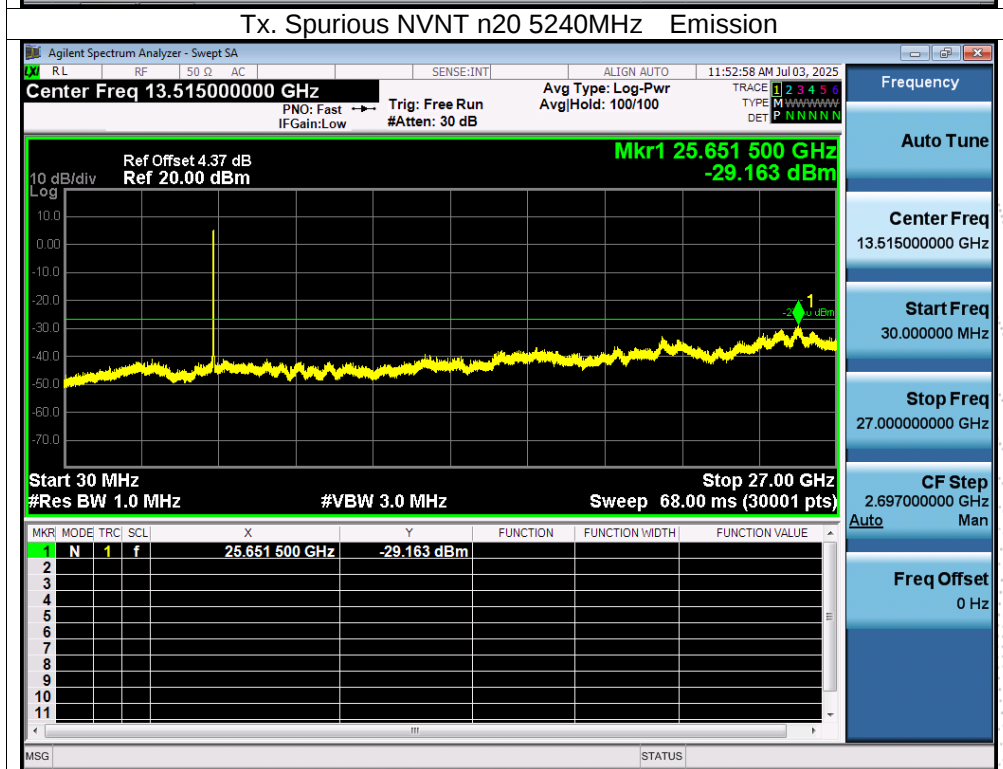
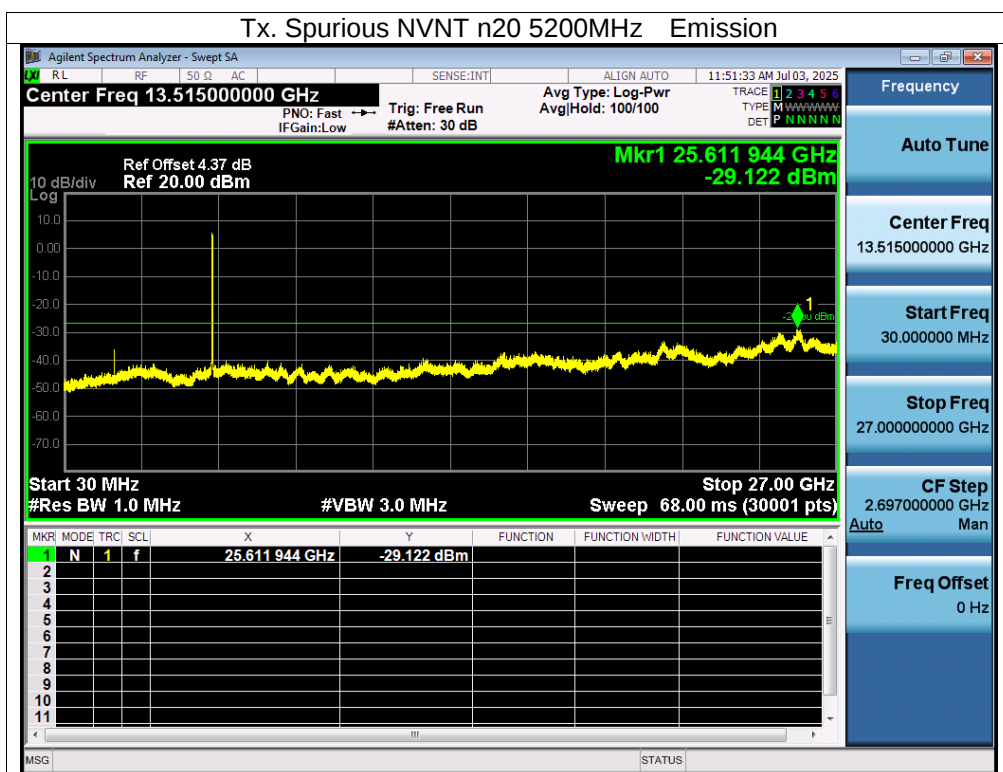
#### Tx. Spurious NVNT a 5180MHz Emission

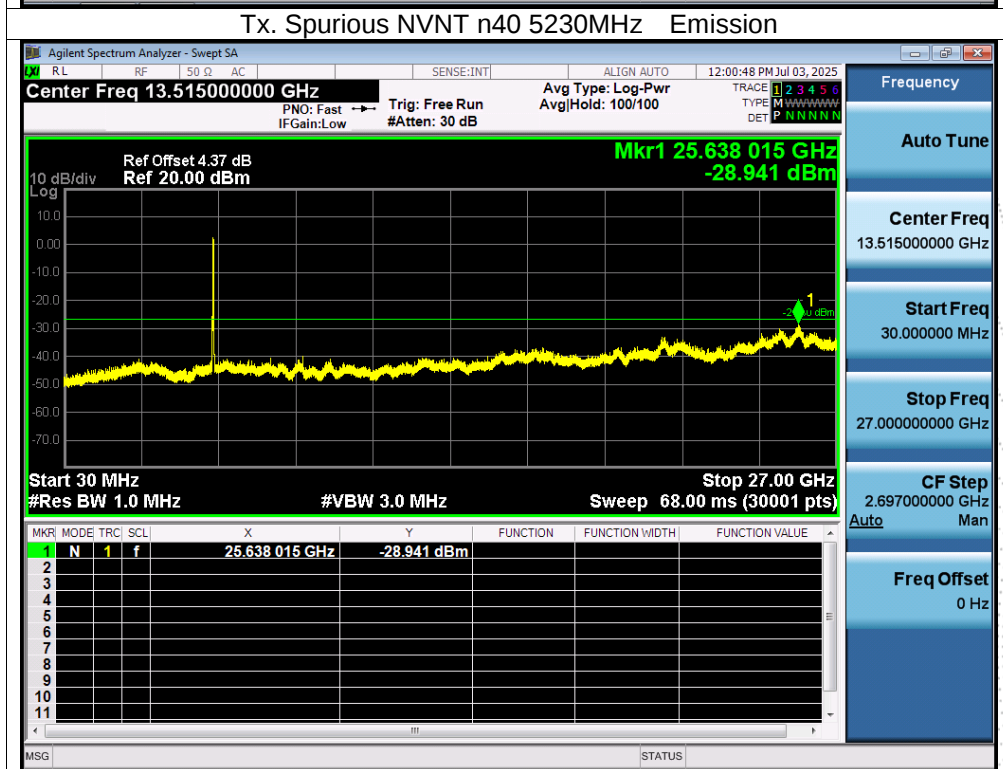
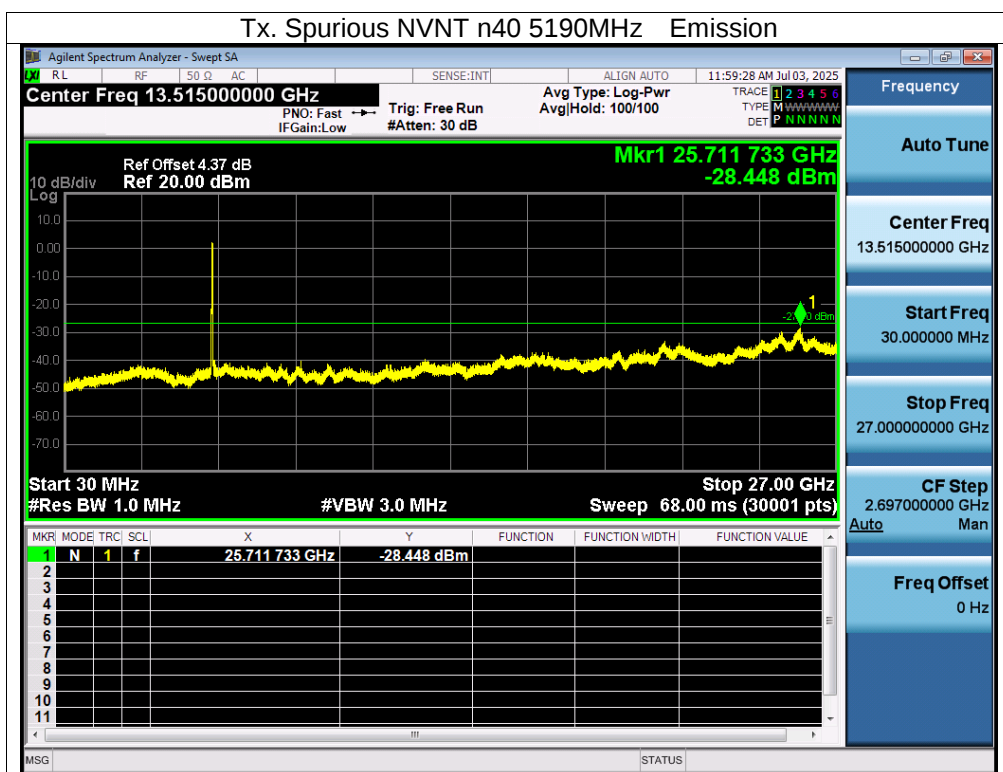


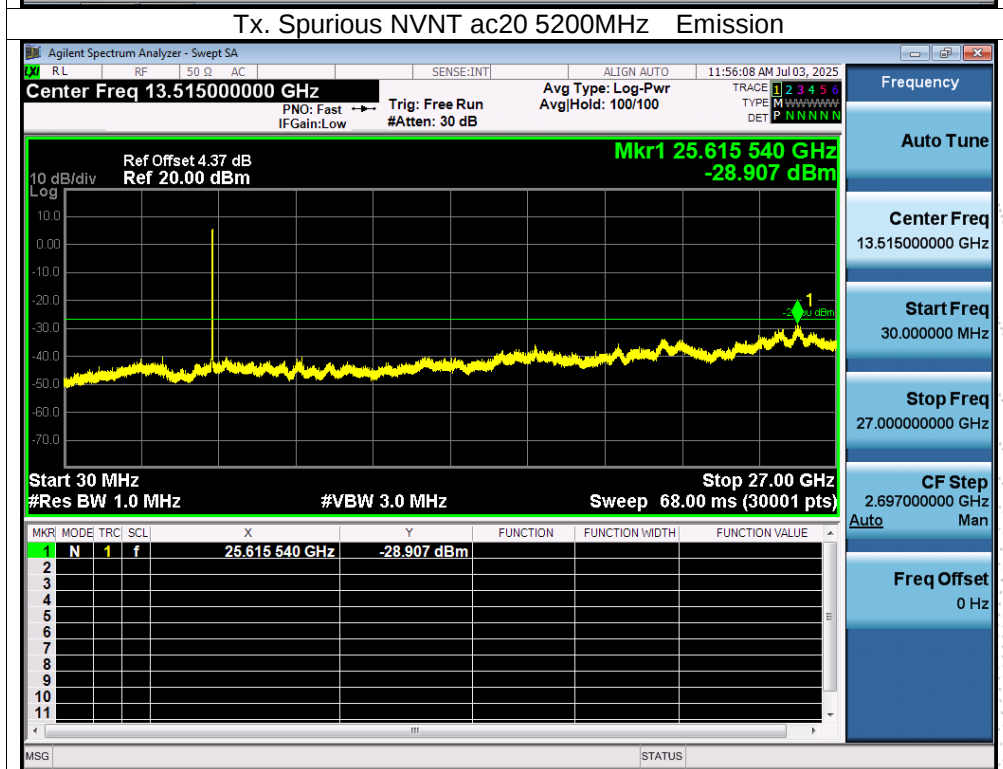
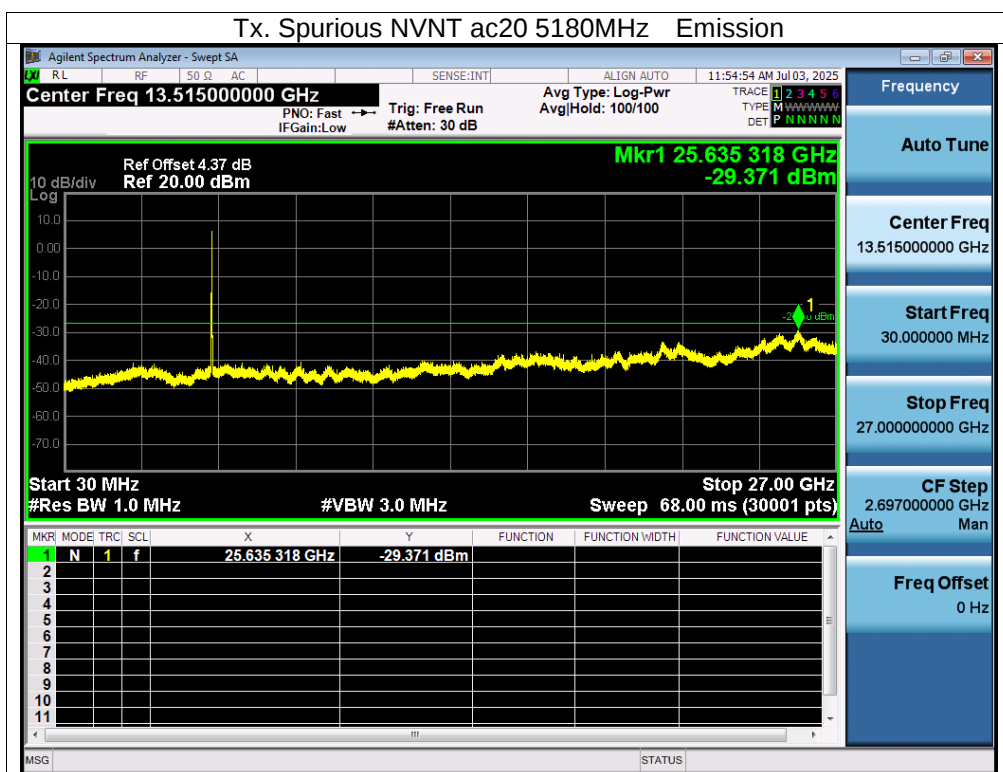
#### Tx. Spurious NVNT a 5200MHz Emission

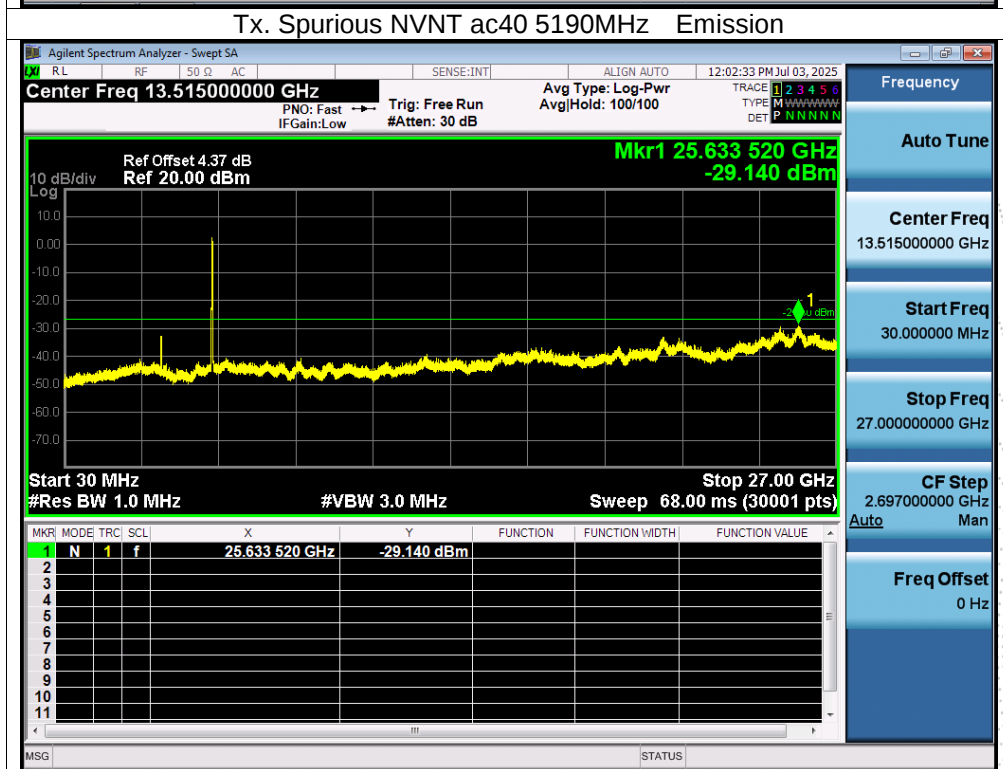
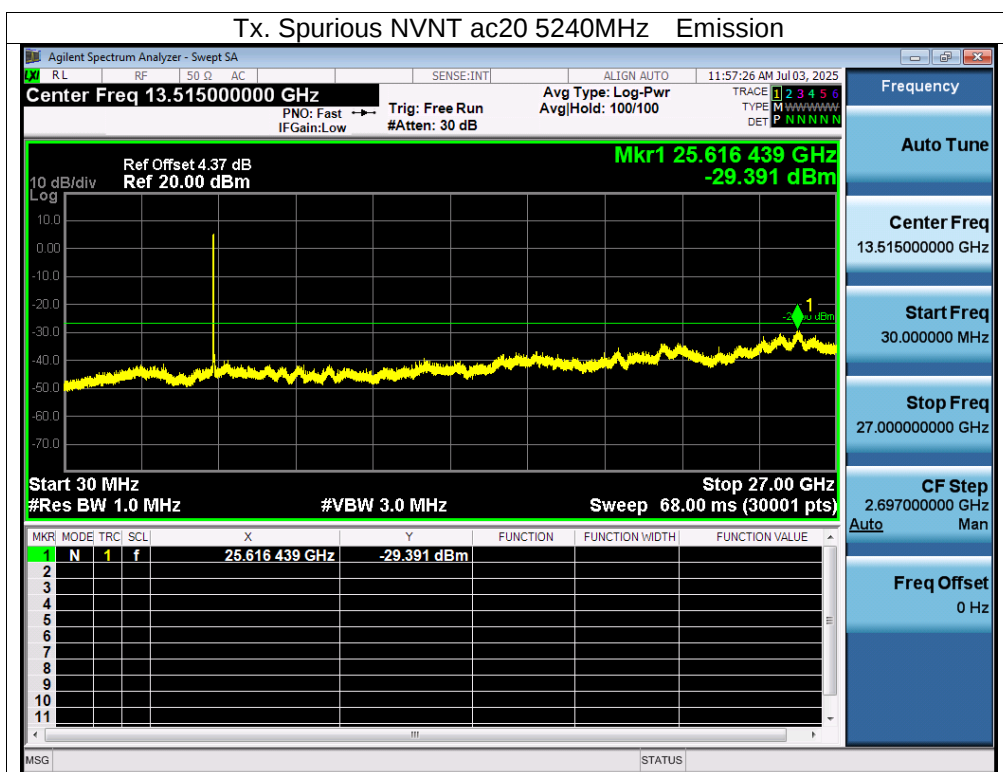


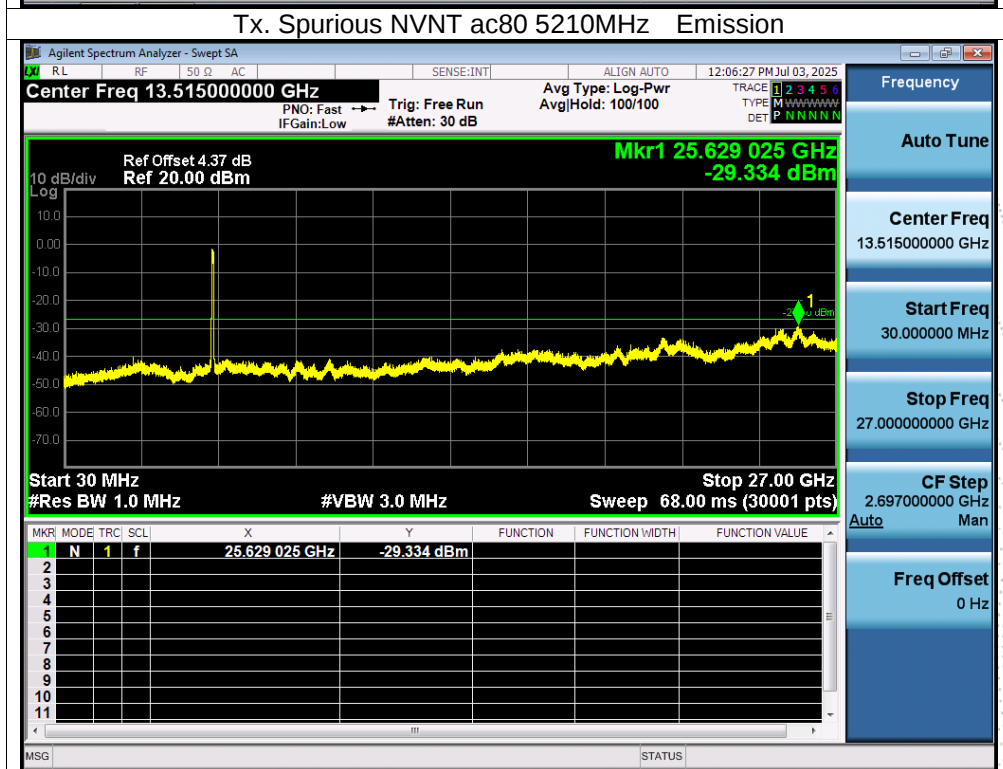
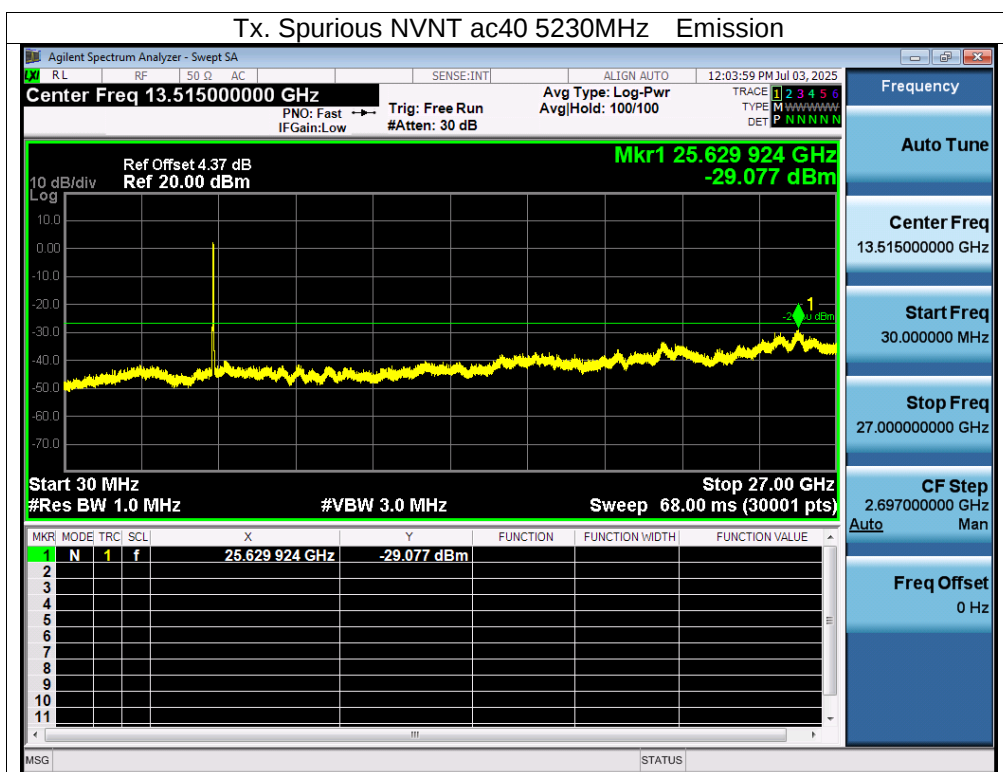






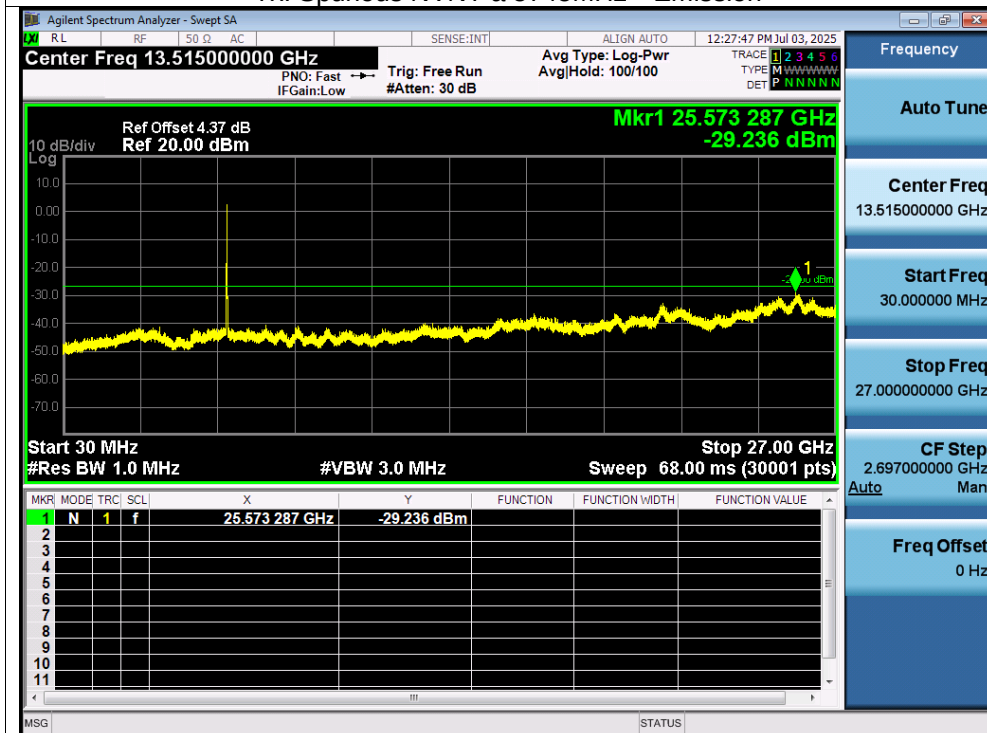




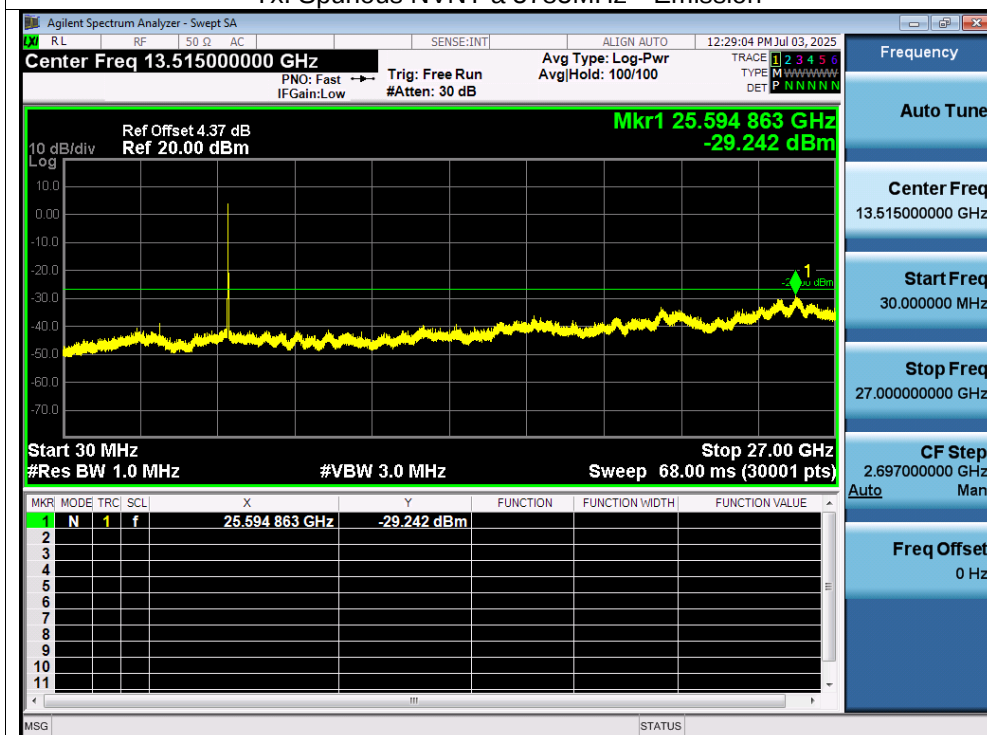


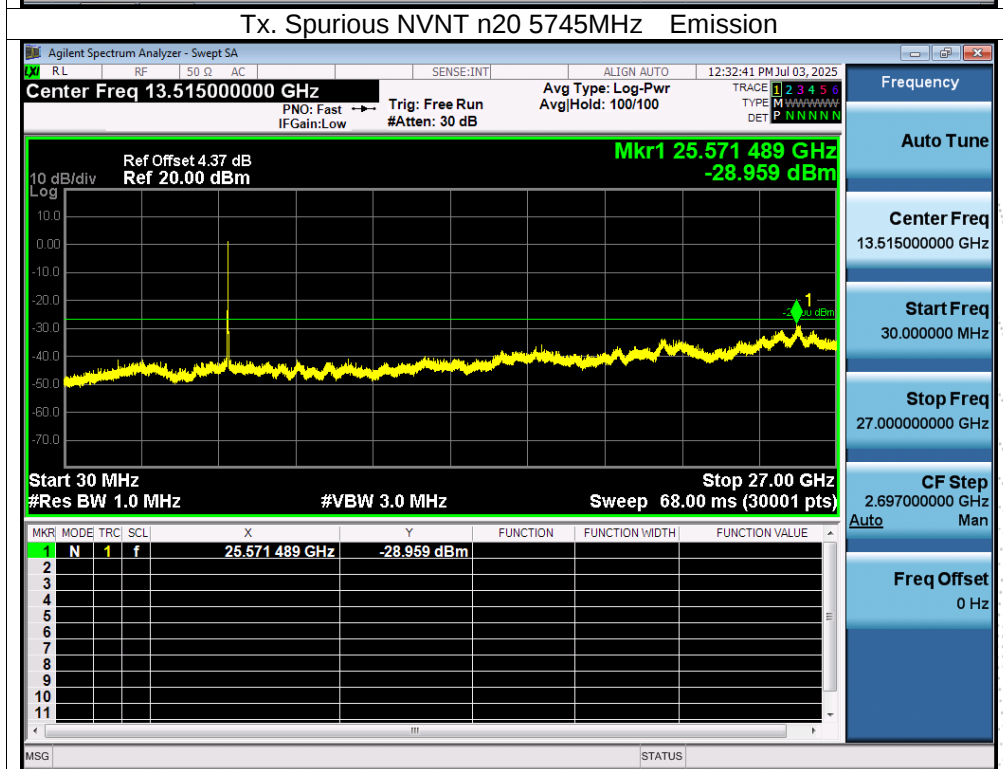
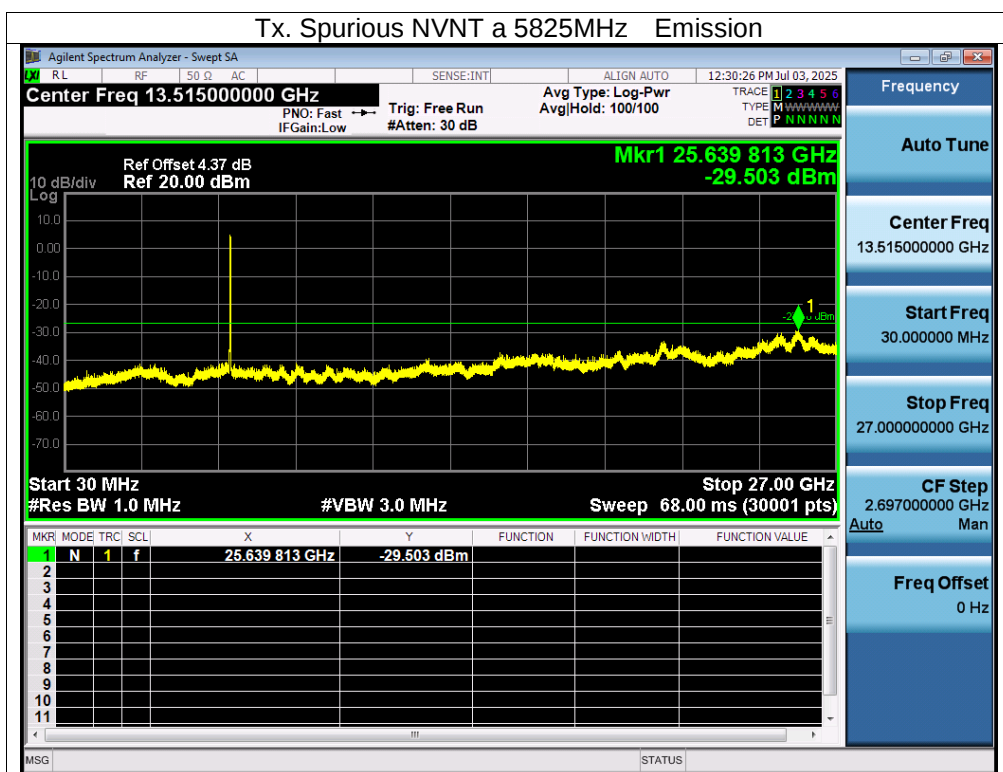
### Test Graphs

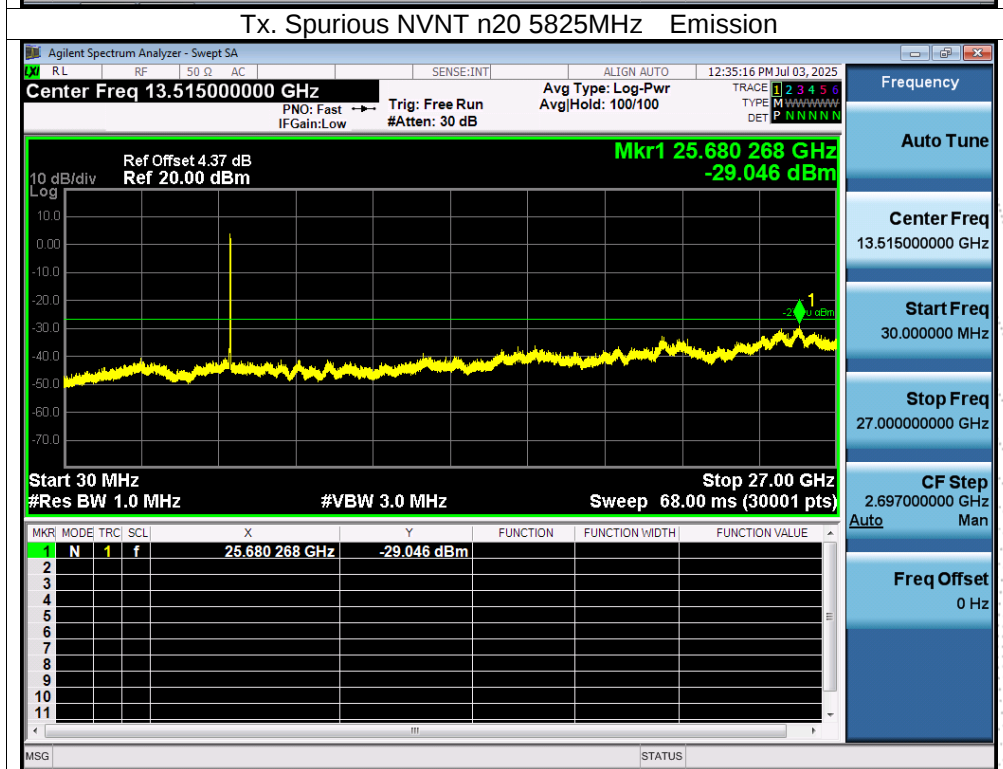
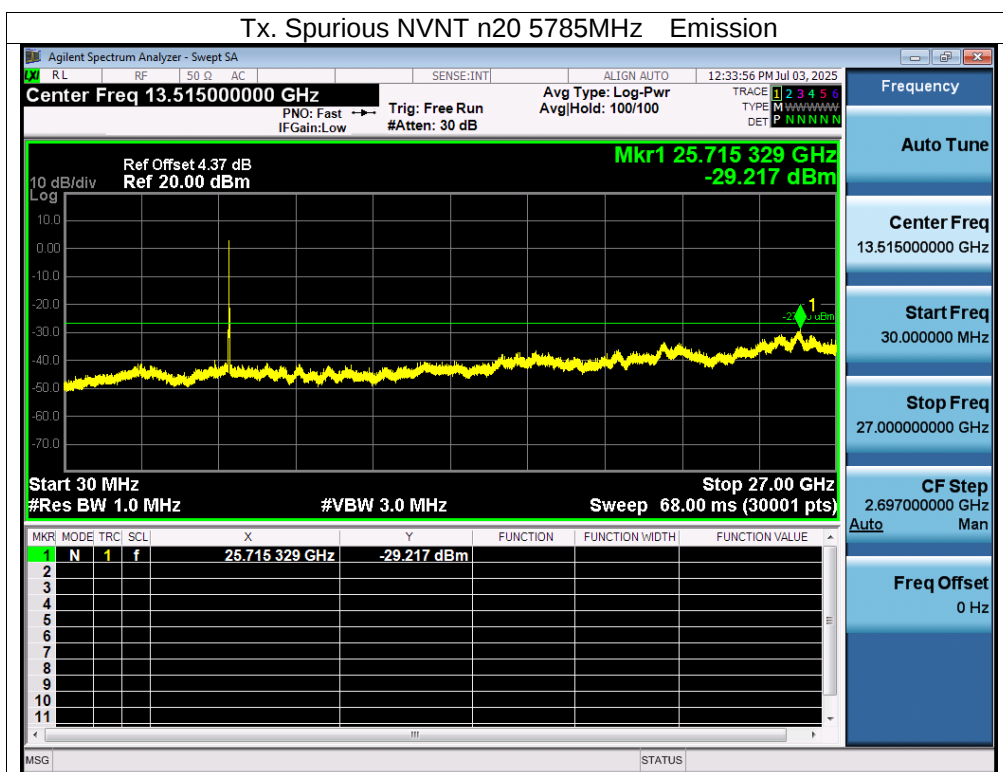
#### Tx. Spurious NVNT a 5745MHz Emission

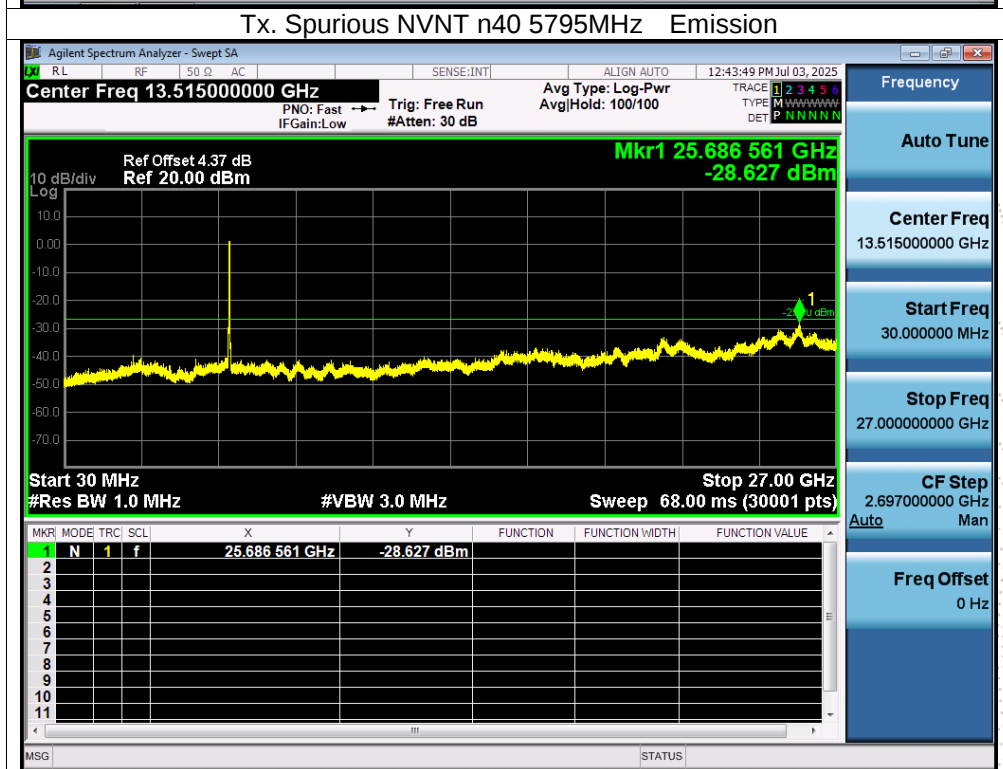
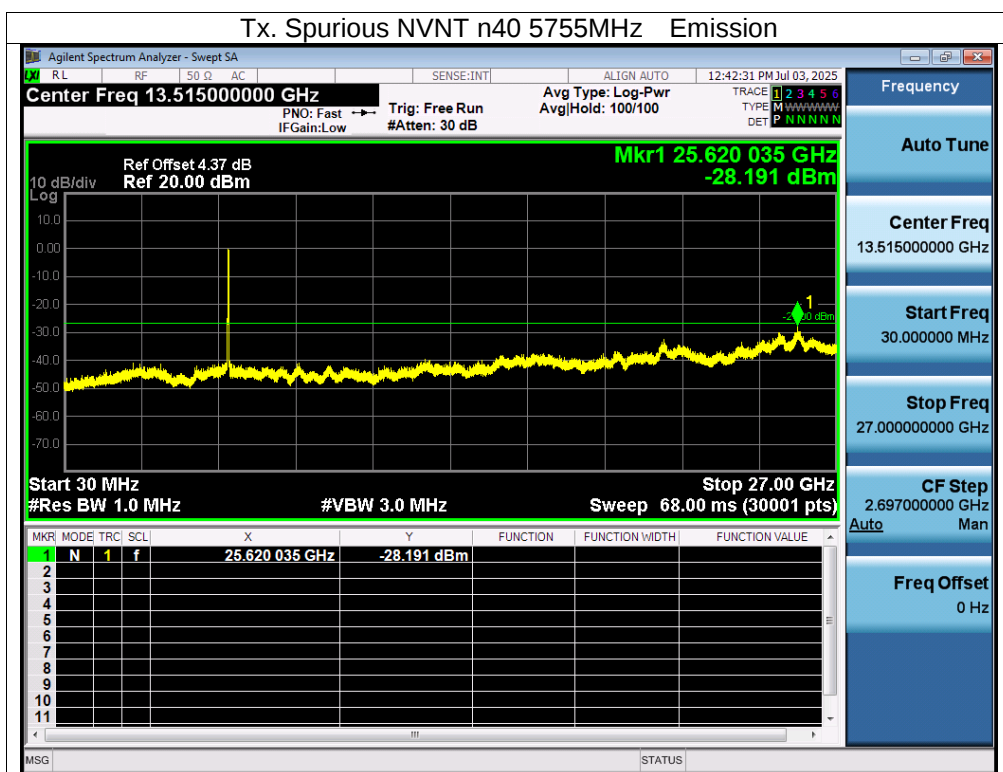


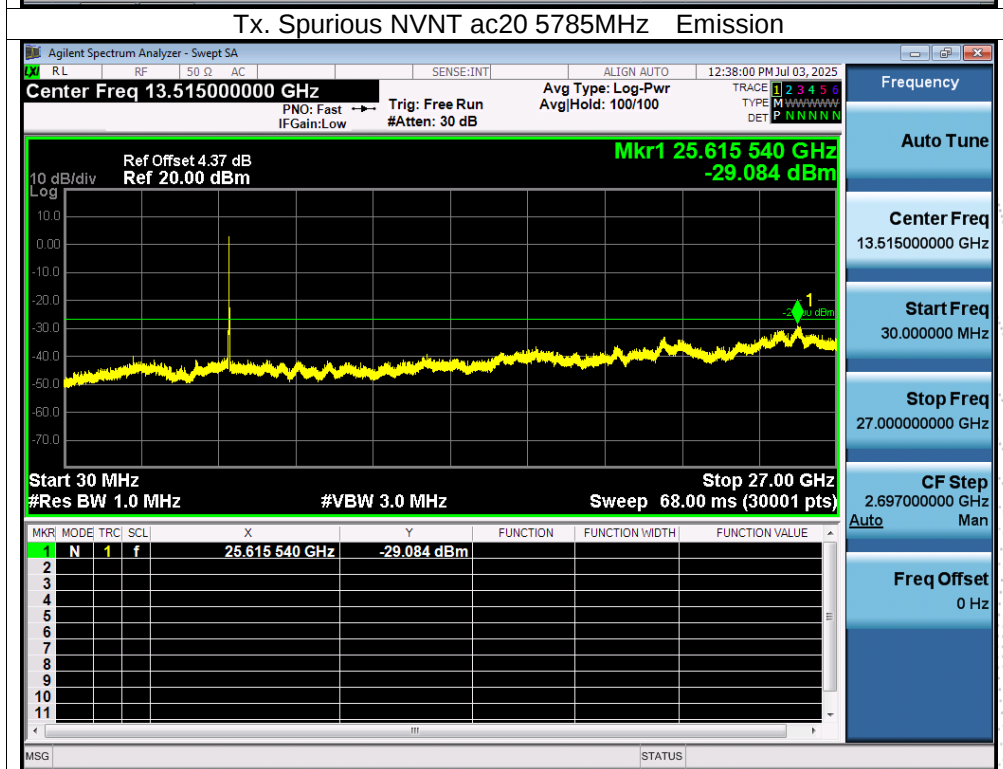
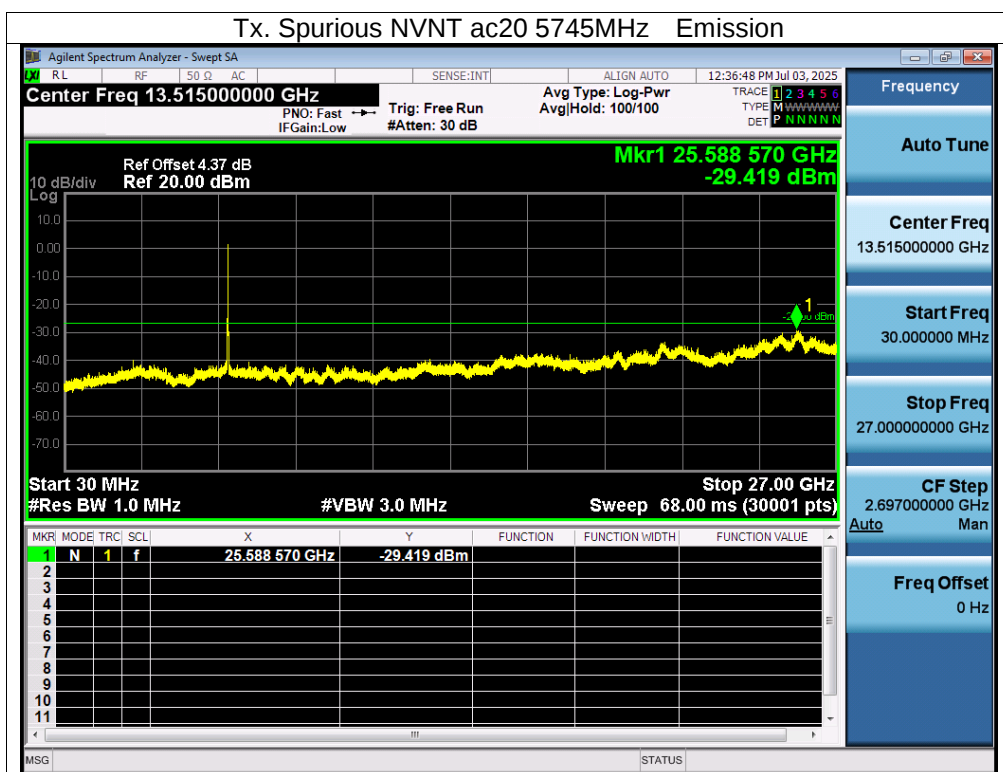
#### Tx. Spurious NVNT a 5785MHz Emission

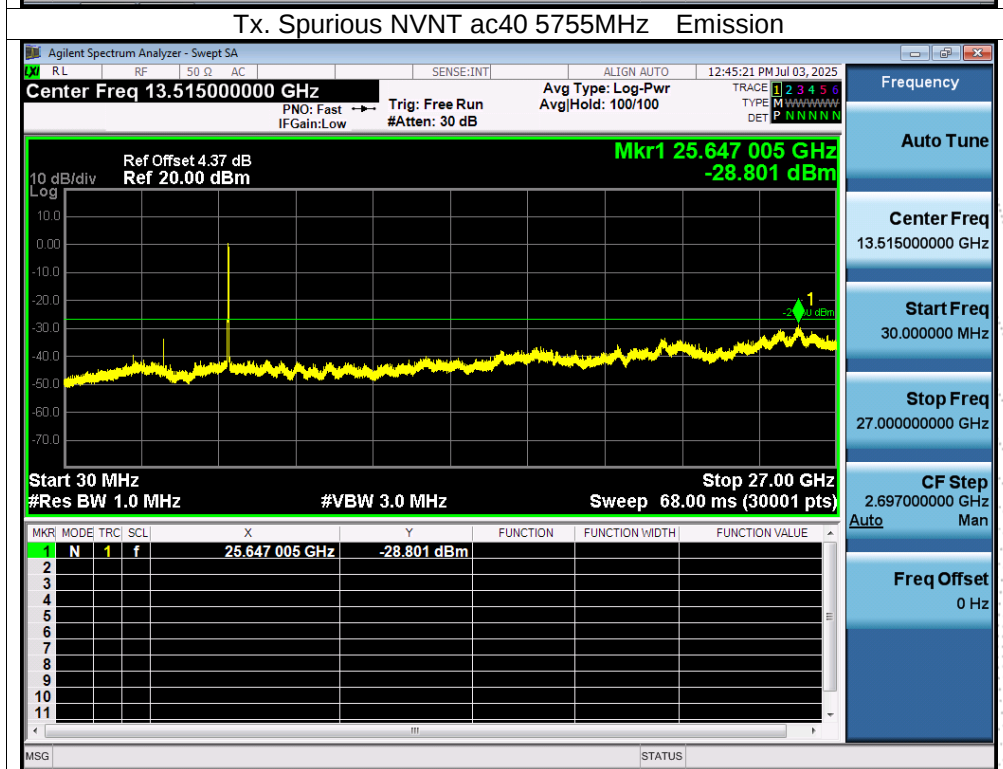
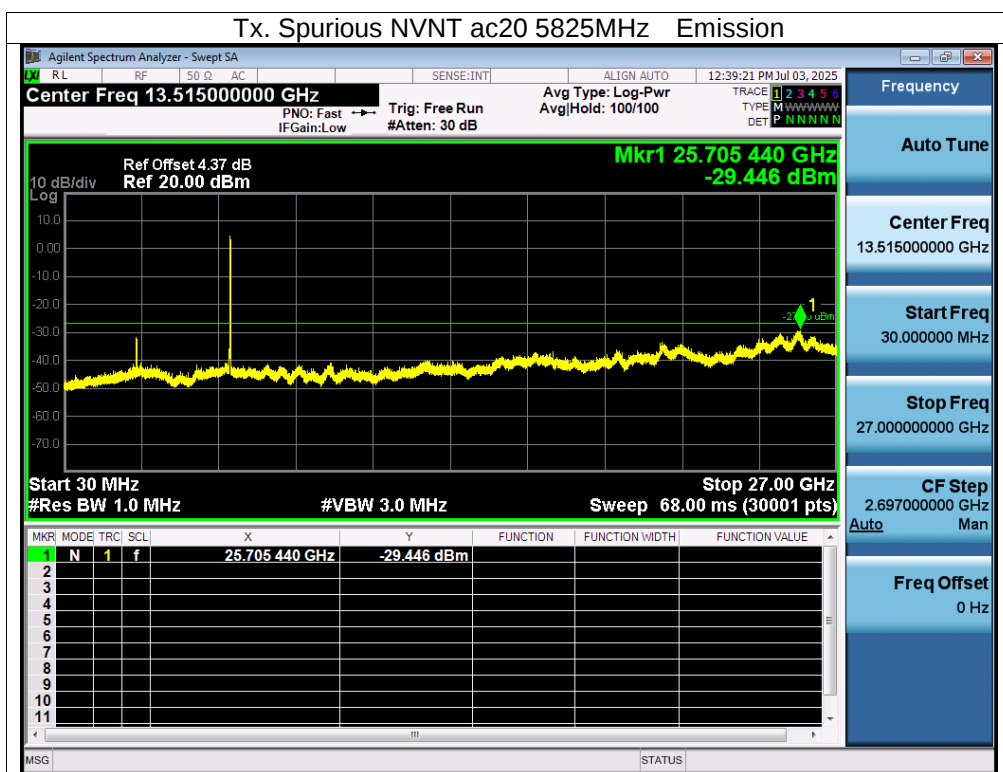


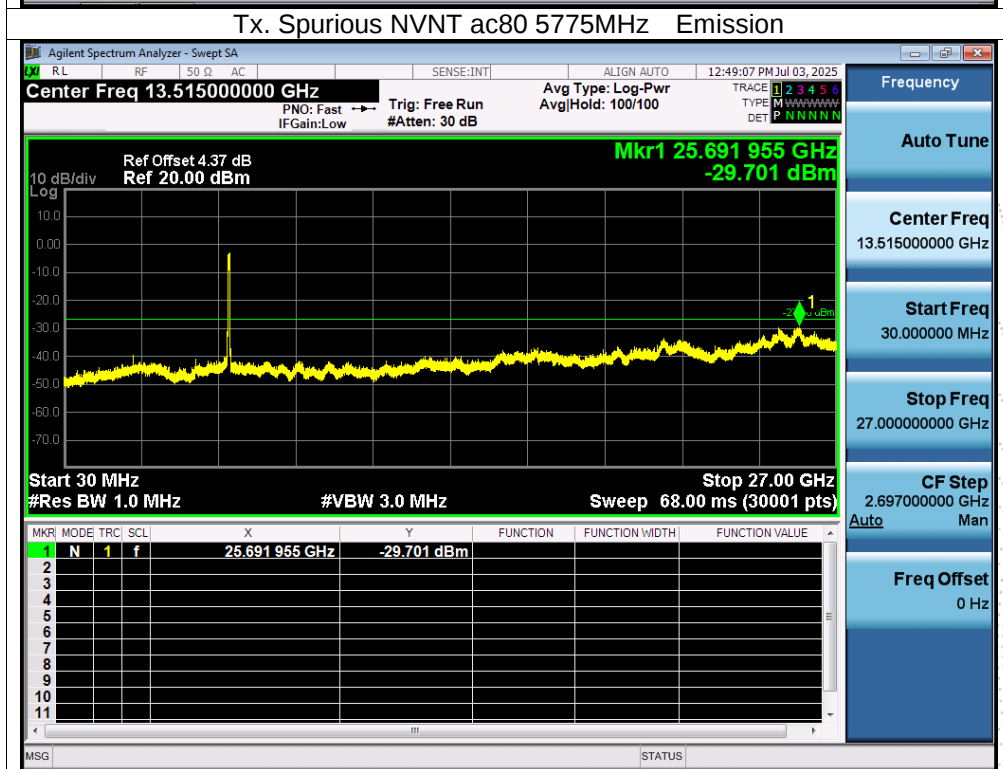
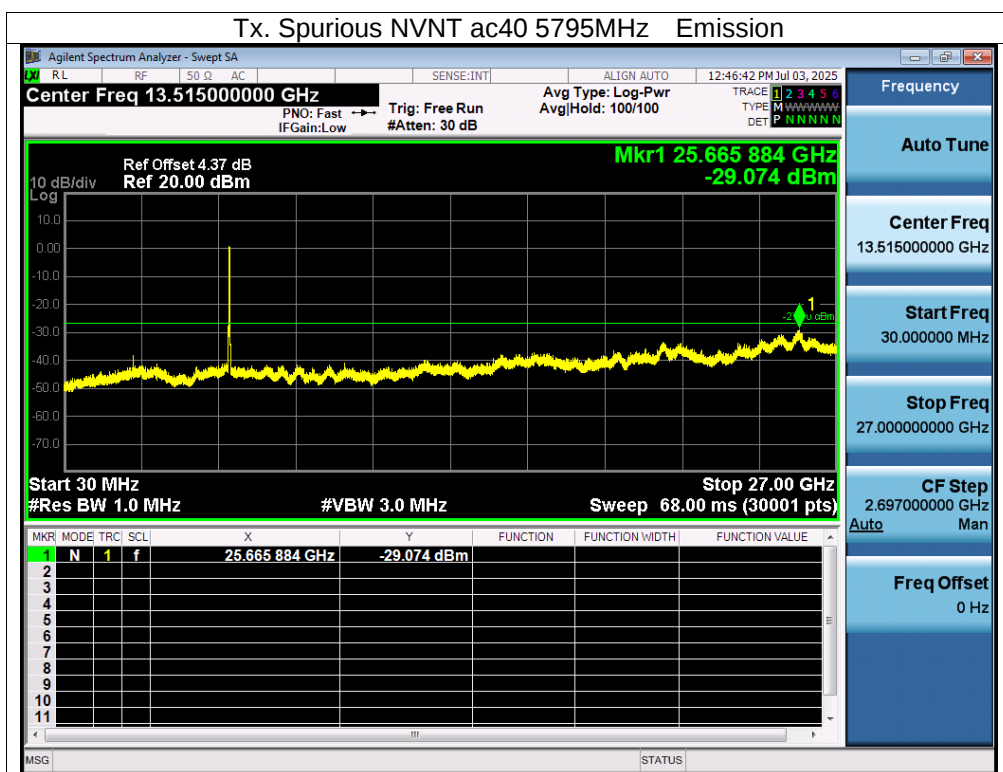












### 13. Frequency Stability Measurement

#### 13.1 Block Diagram Of Test Setup



#### 13.2 Limit

Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be  $\pm 20$  ppm maximum for the 5 GHz band (IEEE 802.11n specification)..

#### 13.3 Test Procedure

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5.  $f_c$  is declaring of channel frequency. Then the frequency error formula is  $(f_c - f) / f_c \times 10^6$  ppm and he limit is less than  $\pm 20$  ppm (IEEE 802.11n specification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is  $-20^\circ\text{C} \sim 70^\circ\text{C}$ .

### 13.4 Test Result

|              |                                     |                    |          |
|--------------|-------------------------------------|--------------------|----------|
| Temperature: | 26 °C                               | Relative Humidity: | 54%      |
| Pressure:    | 101kPa                              | Test Voltage:      | DC 3.87V |
| Test Mode:   | TX Frequency U-NII-1 (5180-5240MHz) |                    |          |

#### Voltage vs. Frequency Stability

| TEST CONDITIONS |    |           |      | Reference Frequency : 5180MHz |      |                      |                      |
|-----------------|----|-----------|------|-------------------------------|------|----------------------|----------------------|
|                 |    |           |      | f                             | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C)      | 20 | V nom (V) | 3.87 | 5180.0124                     | 5180 | 0.0124               | 2.3938               |
|                 |    | V max (V) | 4.45 | 5180.0043                     | 5180 | 0.0043               | 0.8301               |
|                 |    | V min (V) | 3.29 | 5180.0015                     | 5180 | 0.0015               | 0.2896               |
| Limits          |    |           |      | 5150-5250 MHz                 |      |                      |                      |
| Result          |    |           |      | Complies                      |      |                      |                      |

#### Temperature vs. Frequency Stability

| TEST CONDITIONS |      |        |     | Reference Frequency: 5180MHz |      |                      |                      |
|-----------------|------|--------|-----|------------------------------|------|----------------------|----------------------|
|                 |      |        |     | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V)       | 3.87 | T (°C) | -20 | 5180.0077                    | 5180 | 0.0077               | 1.4865               |
|                 |      | T (°C) | -10 | 5180.0092                    | 5180 | 0.0092               | 1.7761               |
|                 |      | T (°C) | 0   | 5180.0129                    | 5180 | 0.0129               | 2.4903               |
|                 |      | T (°C) | 10  | 5180.0064                    | 5180 | 0.0064               | 1.2355               |
|                 |      | T (°C) | 20  | 5180.0090                    | 5180 | 0.0090               | 1.7375               |
|                 |      | T (°C) | 30  | 5180.0068                    | 5180 | 0.0068               | 1.3127               |
|                 |      | T (°C) | 40  | 5180.0117                    | 5180 | 0.0117               | 2.2587               |
|                 |      | T (°C) | 50  | 5180.0135                    | 5180 | 0.0135               | 2.6062               |
|                 |      | T (°C) | 60  | 5180.0015                    | 5180 | 0.0015               | 0.2896               |
|                 |      | T (°C) | 70  | 5180.0004                    | 5180 | 0.0004               | 0.0772               |
| Limits          |      |        |     | 5150-5250 MHz                |      |                      |                      |
| Result          |      |        |     | Complies                     |      |                      |                      |

## Voltage vs. Frequency Stability

| TEST CONDITIONS |    |           |      | Reference Frequency: 5200MHz |      |                      |                      |
|-----------------|----|-----------|------|------------------------------|------|----------------------|----------------------|
|                 |    |           |      | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C)      | 20 | V nom (V) | 3.87 | 5200.0055                    | 5200 | 0.0055               | 1.0577               |
|                 |    | V max (V) | 4.45 | 5200.0098                    | 5200 | 0.0098               | 1.8846               |
|                 |    | V min (V) | 3.29 | 5200.0134                    | 5200 | 0.0134               | 2.5769               |
| Limits          |    |           |      | 5150-5250 MHz                |      |                      |                      |
| Result          |    |           |      | Complies                     |      |                      |                      |

## Temperature vs. Frequency Stability

| TEST CONDITIONS |      |        |     | Reference Frequency: 5200MHz |      |                      |                      |
|-----------------|------|--------|-----|------------------------------|------|----------------------|----------------------|
|                 |      |        |     | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V)       | 3.87 | T (°C) | -20 | 5200.01210                   | 5200 | 0.01210              | 2.3269               |
|                 |      | T (°C) | -10 | 5200.00750                   | 5200 | 0.00750              | 1.4423               |
|                 |      | T (°C) | 0   | 5200.00850                   | 5200 | 0.00850              | 1.6346               |
|                 |      | T (°C) | 10  | 5200.01240                   | 5200 | 0.01240              | 2.3846               |
|                 |      | T (°C) | 20  | 5200.00690                   | 5200 | 0.00690              | 1.3269               |
|                 |      | T (°C) | 30  | 5200.00240                   | 5200 | 0.00240              | 0.4615               |
|                 |      | T (°C) | 40  | 5200.00960                   | 5200 | 0.00960              | 1.8462               |
|                 |      | T (°C) | 50  | 5200.00720                   | 5200 | 0.00720              | 1.3846               |
|                 |      | T (°C) | 60  | 5200.00780                   | 5200 | 0.00780              | 1.5000               |
|                 |      | T (°C) | 70  | 5200.01000                   | 5200 | 0.01000              | 1.9231               |
| Limits          |      |        |     | 5150-5250 MHz                |      |                      |                      |
| Result          |      |        |     | Complies                     |      |                      |                      |

## Voltage vs. Frequency Stability

| TEST CONDITIONS |    |           |      | Reference Frequency: 5240MHz |      |                      |                      |
|-----------------|----|-----------|------|------------------------------|------|----------------------|----------------------|
|                 |    |           |      | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C)      | 20 | V nom (V) | 3.87 | 5240.0070                    | 5240 | 0.0070               | 1.3359               |
|                 |    | V max (V) | 4.45 | 5240.0070                    | 5240 | 0.0070               | 1.3359               |
|                 |    | V min (V) | 3.29 | 5240.0040                    | 5240 | 0.0040               | 0.7634               |
| Limits          |    |           |      | 5150-5250 MHz                |      |                      |                      |
| Result          |    |           |      | Complies                     |      |                      |                      |

## Temperature vs. Frequency Stability

| TEST CONDITIONS |      |        |     | Reference Frequency: 5240MHz |      |                      |                      |
|-----------------|------|--------|-----|------------------------------|------|----------------------|----------------------|
|                 |      |        |     | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V)       | 3.87 | T (°C) | -20 | 5240.0105                    | 5240 | 0.0105               | 2.0038               |
|                 |      | T (°C) | -10 | 5240.0034                    | 5240 | 0.0034               | 0.6489               |
|                 |      | T (°C) | 0   | 5240.0114                    | 5240 | 0.0114               | 2.1756               |
|                 |      | T (°C) | 10  | 5240.0084                    | 5240 | 0.0084               | 1.6031               |
|                 |      | T (°C) | 20  | 5240.0025                    | 5240 | 0.0025               | 0.4771               |
|                 |      | T (°C) | 30  | 5240.0022                    | 5240 | 0.0022               | 0.4198               |
|                 |      | T (°C) | 40  | 5240.0009                    | 5240 | 0.0009               | 0.1718               |
|                 |      | T (°C) | 50  | 5240.0108                    | 5240 | 0.0108               | 2.0611               |
|                 |      | T (°C) | 60  | 5240.0106                    | 5240 | 0.0106               | 2.0229               |
|                 |      | T (°C) | 70  | 5240.0076                    | 5240 | 0.0076               | 1.4504               |
| Limits          |      |        |     | 5150-5250 MHz                |      |                      |                      |
| Result          |      |        |     | Complies                     |      |                      |                      |

|              |                            |                    |          |
|--------------|----------------------------|--------------------|----------|
| Temperature: | 26 °C                      | Relative Humidity: | 54%      |
| Pressure:    | 101kPa                     | Test Voltage:      | DC 3.87V |
| Test Mode:   | TX Frequency(5745-5825MHz) |                    |          |

#### Voltage vs. Frequency Stability

| TEST CONDITIONS |    |           |      | Reference Frequency: 5745MHz |      |                      |                      |
|-----------------|----|-----------|------|------------------------------|------|----------------------|----------------------|
|                 |    |           |      | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C)      | 20 | V nom (V) | 3.87 | 5745.00830                   | 5745 | 0.00830              | 1.4447               |
|                 |    | V max (V) | 4.45 | 5745.00250                   | 5745 | 0.00250              | 0.4352               |
|                 |    | V min (V) | 3.29 | 5745.00570                   | 5745 | 0.00570              | 0.9922               |
| Limits          |    |           |      | 5725-5850 MHz                |      |                      |                      |
| Result          |    |           |      | Complies                     |      |                      |                      |

#### Temperature vs. Frequency Stability

| TEST CONDITIONS |      |        |     | Reference Frequency: 5745MHz |      |                      |                      |
|-----------------|------|--------|-----|------------------------------|------|----------------------|----------------------|
|                 |      |        |     | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V)       | 3.87 | T (°C) | -20 | 5745.01040                   | 5745 | 0.01040              | 1.8103               |
|                 |      | T (°C) | -10 | 5745.00410                   | 5745 | 0.00410              | 0.7137               |
|                 |      | T (°C) | 0   | 5745.01000                   | 5745 | 0.01000              | 1.7406               |
|                 |      | T (°C) | 10  | 5745.00330                   | 5745 | 0.00330              | 0.5744               |
|                 |      | T (°C) | 20  | 5745.00250                   | 5745 | 0.00250              | 0.4352               |
|                 |      | T (°C) | 30  | 5745.01190                   | 5745 | 0.01190              | 2.0714               |
|                 |      | T (°C) | 40  | 5745.00930                   | 5745 | 0.00930              | 1.6188               |
|                 |      | T (°C) | 50  | 5745.00040                   | 5745 | 0.00040              | 0.0696               |
|                 |      | T (°C) | 60  | 5745.00980                   | 5745 | 0.00980              | 1.7058               |
|                 |      | T (°C) | 70  | 5745.00610                   | 5745 | 0.00610              | 1.0618               |
| Limits          |      |        |     | 5725-5850 MHz                |      |                      |                      |
| Result          |      |        |     | Complies                     |      |                      |                      |

## Voltage vs. Frequency Stability

| TEST CONDITIONS |    |           |      | Reference Frequency: 5785MHz |      |                      |                      |
|-----------------|----|-----------|------|------------------------------|------|----------------------|----------------------|
|                 |    |           |      | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C)      | 20 | V nom (V) | 3.87 | 5785.00040                   | 5785 | 0.00040              | 0.0691               |
|                 |    | V max (V) | 4.45 | 5785.00720                   | 5785 | 0.00720              | 1.2446               |
|                 |    | V min (V) | 3.29 | 5785.00110                   | 5785 | 0.00110              | 0.1901               |
| Limits          |    |           |      | 5725-5850 MHz                |      |                      |                      |
| Result          |    |           |      | Complies                     |      |                      |                      |

## Temperature vs. Frequency Stability

| TEST CONDITIONS |      |        |     | Reference Frequency: 5785MHz |      |                      |                      |
|-----------------|------|--------|-----|------------------------------|------|----------------------|----------------------|
|                 |      |        |     | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V)       | 3.87 | T (°C) | -20 | 5785.00960                   | 5785 | 0.00960              | 1.6595               |
|                 |      | T (°C) | -10 | 5785.00170                   | 5785 | 0.00170              | 0.2939               |
|                 |      | T (°C) | 0   | 5785.01240                   | 5785 | 0.01240              | 2.1435               |
|                 |      | T (°C) | 10  | 5785.00430                   | 5785 | 0.00430              | 0.7433               |
|                 |      | T (°C) | 20  | 5785.00210                   | 5785 | 0.00210              | 0.3630               |
|                 |      | T (°C) | 30  | 5785.01300                   | 5785 | 0.01300              | 2.2472               |
|                 |      | T (°C) | 40  | 5785.00780                   | 5785 | 0.00780              | 1.3483               |
|                 |      | T (°C) | 50  | 5785.00810                   | 5785 | 0.00810              | 1.4002               |
|                 |      | T (°C) | 60  | 5785.00800                   | 5785 | 0.00800              | 1.3829               |
|                 |      | T (°C) | 70  | 5785.00100                   | 5785 | 0.00100              | 0.1729               |
| Limits          |      |        |     | 5725-5850 MHz                |      |                      |                      |
| Result          |      |        |     | Complies                     |      |                      |                      |

## Voltage vs. Frequency Stability

| TEST CONDITIONS |    |           |      | Reference Frequency: 5825MHz |      |                      |                      |
|-----------------|----|-----------|------|------------------------------|------|----------------------|----------------------|
|                 |    |           |      | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| T nom (°C)      | 20 | V nom (V) | 3.87 | 5825.00390                   | 5825 | 0.00390              | 0.6695               |
|                 |    | V max (V) | 4.45 | 5825.00160                   | 5825 | 0.00160              | 0.2747               |
|                 |    | V min (V) | 3.29 | 5825.01030                   | 5825 | 0.01030              | 1.7682               |
| Limits          |    |           |      | 5725-5850 MHz                |      |                      |                      |
| Result          |    |           |      | Complies                     |      |                      |                      |

## Temperature vs. Frequency Stability

| TEST CONDITIONS |      |        |     | Reference Frequency: 5825MHz |      |                      |                      |
|-----------------|------|--------|-----|------------------------------|------|----------------------|----------------------|
|                 |      |        |     | f                            | fc   | Max. Deviation (MHz) | Max. Deviation (ppm) |
| V nom (V)       | 3.87 | T (°C) | -20 | 5825.00090                   | 5825 | 0.00090              | 0.1545               |
|                 |      | T (°C) | -10 | 5825.00590                   | 5825 | 0.00590              | 1.0129               |
|                 |      | T (°C) | 0   | 5825.00250                   | 5825 | 0.00250              | 0.4292               |
|                 |      | T (°C) | 10  | 5825.00460                   | 5825 | 0.00460              | 0.7897               |
|                 |      | T (°C) | 20  | 5825.00260                   | 5825 | 0.00260              | 0.4464               |
|                 |      | T (°C) | 30  | 5825.00630                   | 5825 | 0.00630              | 1.0815               |
|                 |      | T (°C) | 40  | 5825.00020                   | 5825 | 0.00020              | 0.0343               |
|                 |      | T (°C) | 50  | 5825.00110                   | 5825 | 0.00110              | 0.1888               |
|                 |      | T (°C) | 60  | 5825.00180                   | 5825 | 0.00180              | 0.3090               |
|                 |      | T (°C) | 70  | 5825.01170                   | 5825 | 0.01170              | 2.0086               |
| Limits          |      |        |     | 5725-5850 MHz                |      |                      |                      |
| Result          |      |        |     | Complies                     |      |                      |                      |

## 14. Duty Cycle Of Test Signal

### 14.1 Standard Requirement

Pre-analysis Check: While conducting average power measurement, duty cycle of each mode shall be checked to ensure its duty cycle in order to compensate for the loss due to insufficient ratio of duty cycle. All duty cycle is pre-scanned, and result as obtained below shows only the most representative ones where duty cycle is conducted as the given transmission with given virtual operation that expresses the percentage.

### 14.2 Formula

Duty Cycle =  $T_{on} / (T_{on} + T_{off})$

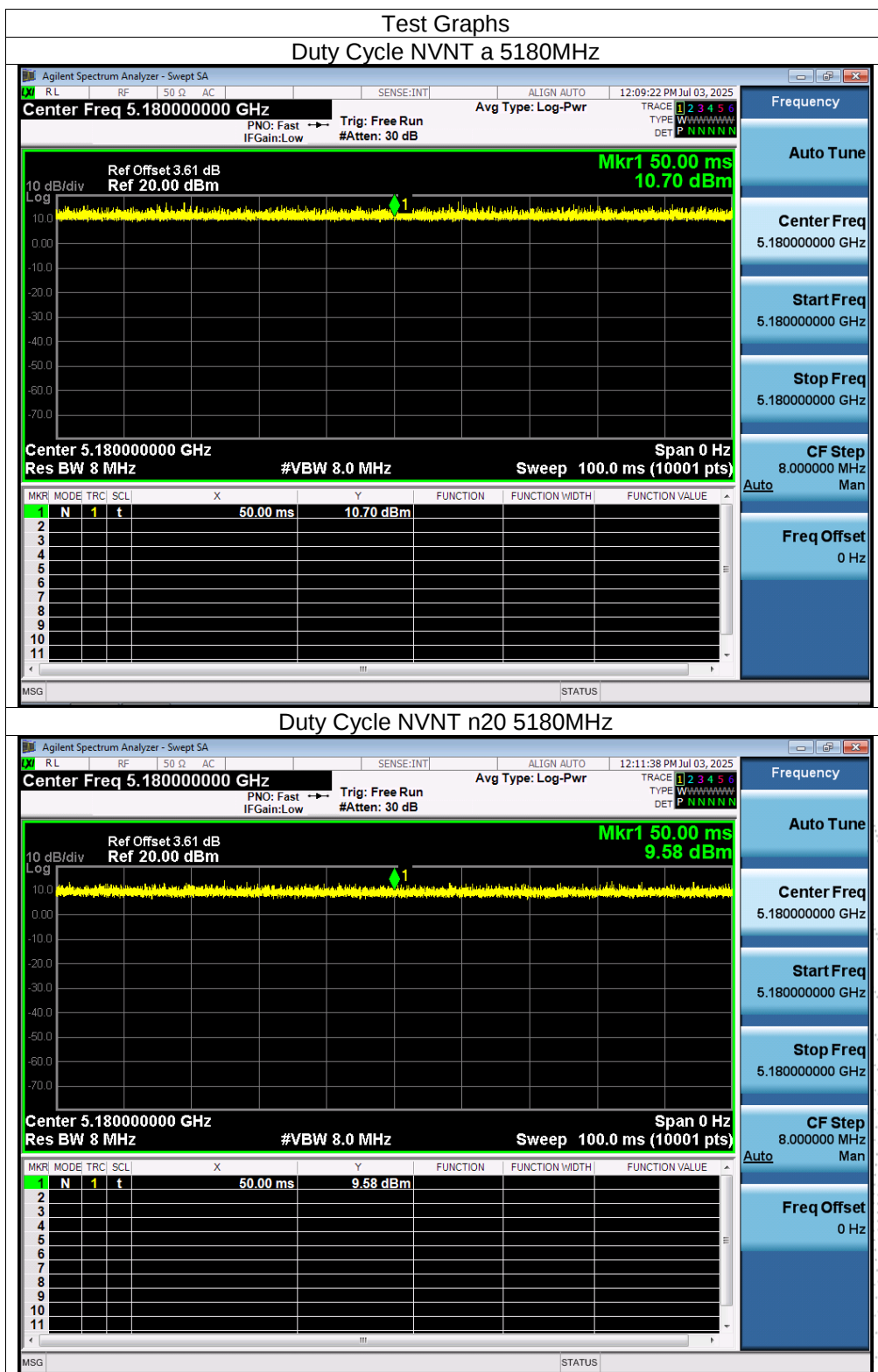
### 14.3 Test Procedure

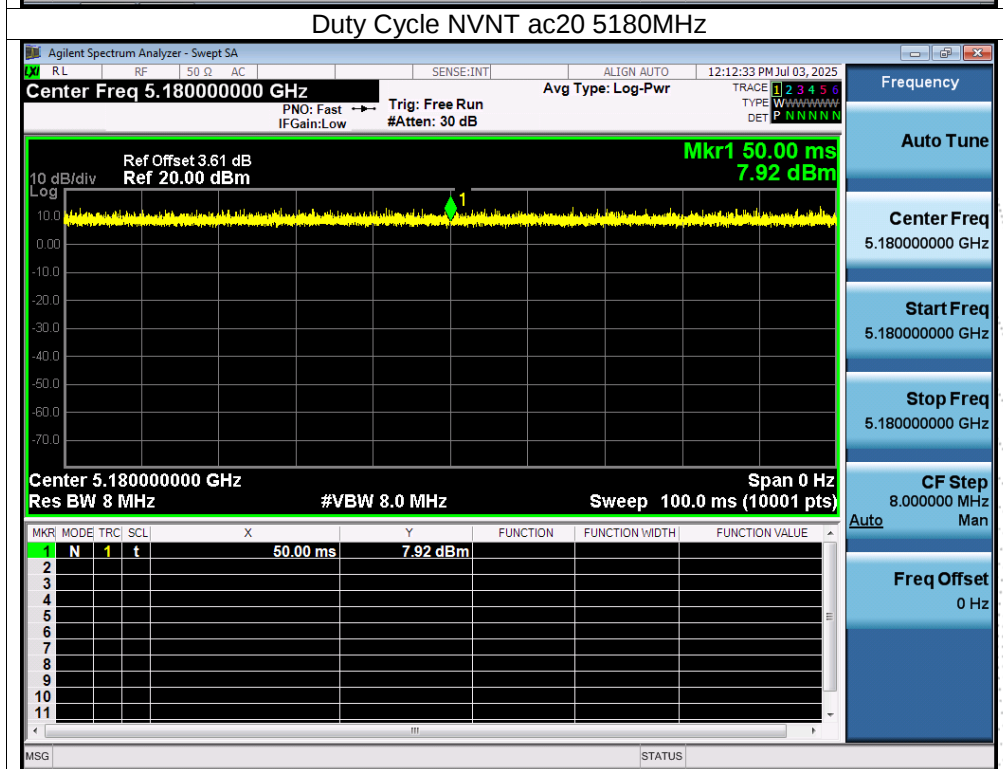
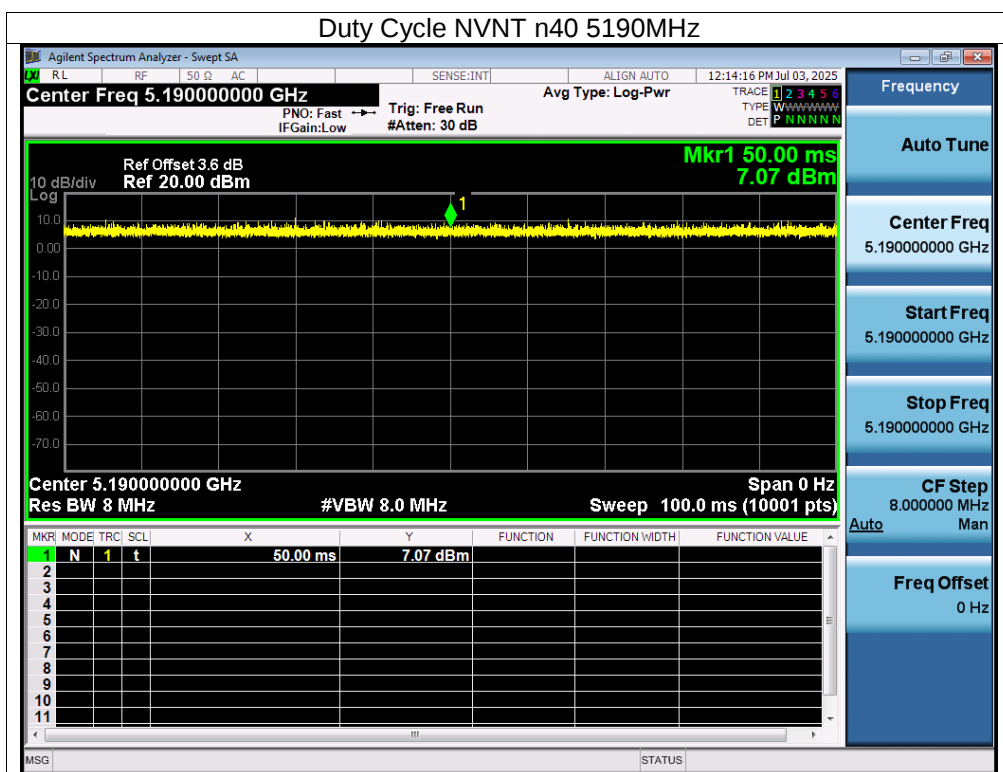
1. Set span = Zero
2. RBW = 8MHz
3. VBW = 8MHz,
4. Detector = Peak

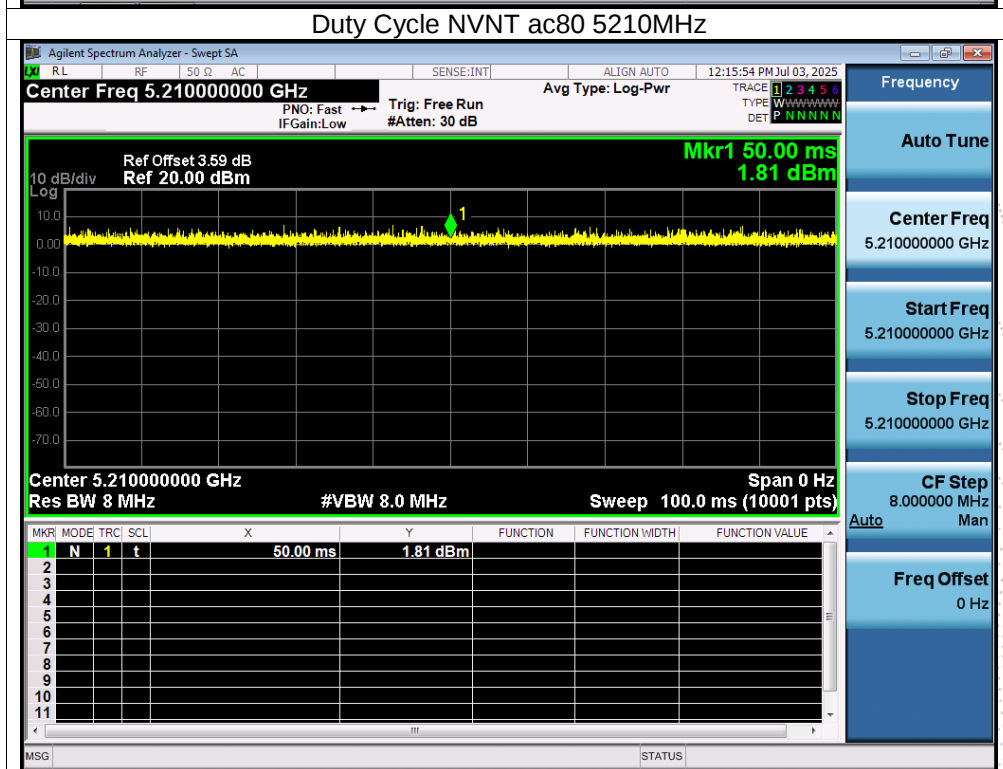
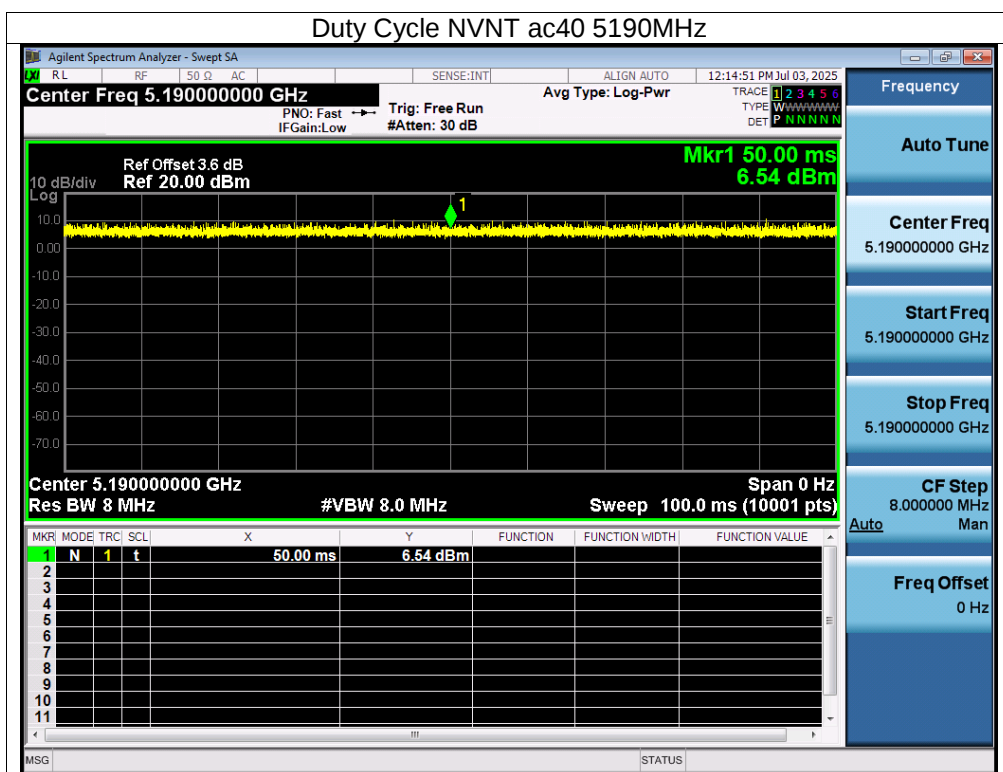
### 14.4 Test Result

5.1G

| Condition | Mode | Frequency (MHz) | Duty Cycle (%) | Correction Factor (dB) |
|-----------|------|-----------------|----------------|------------------------|
| NVNT      | a    | 5180            | 100            | 0                      |
| NVNT      | n20  | 5180            | 100            | 0                      |
| NVNT      | n40  | 5190            | 100            | 0                      |
| NVNT      | ac20 | 5180            | 100            | 0                      |
| NVNT      | ac40 | 5190            | 100            | 0                      |
| NVNT      | ac80 | 5210            | 100            | 0                      |

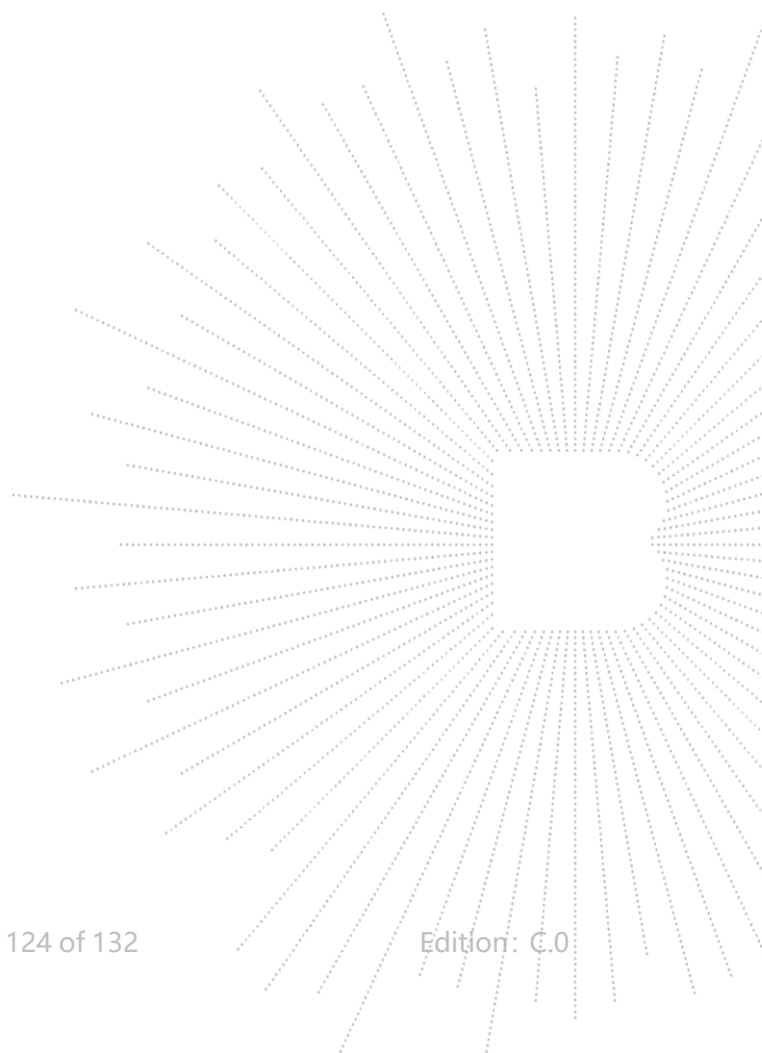


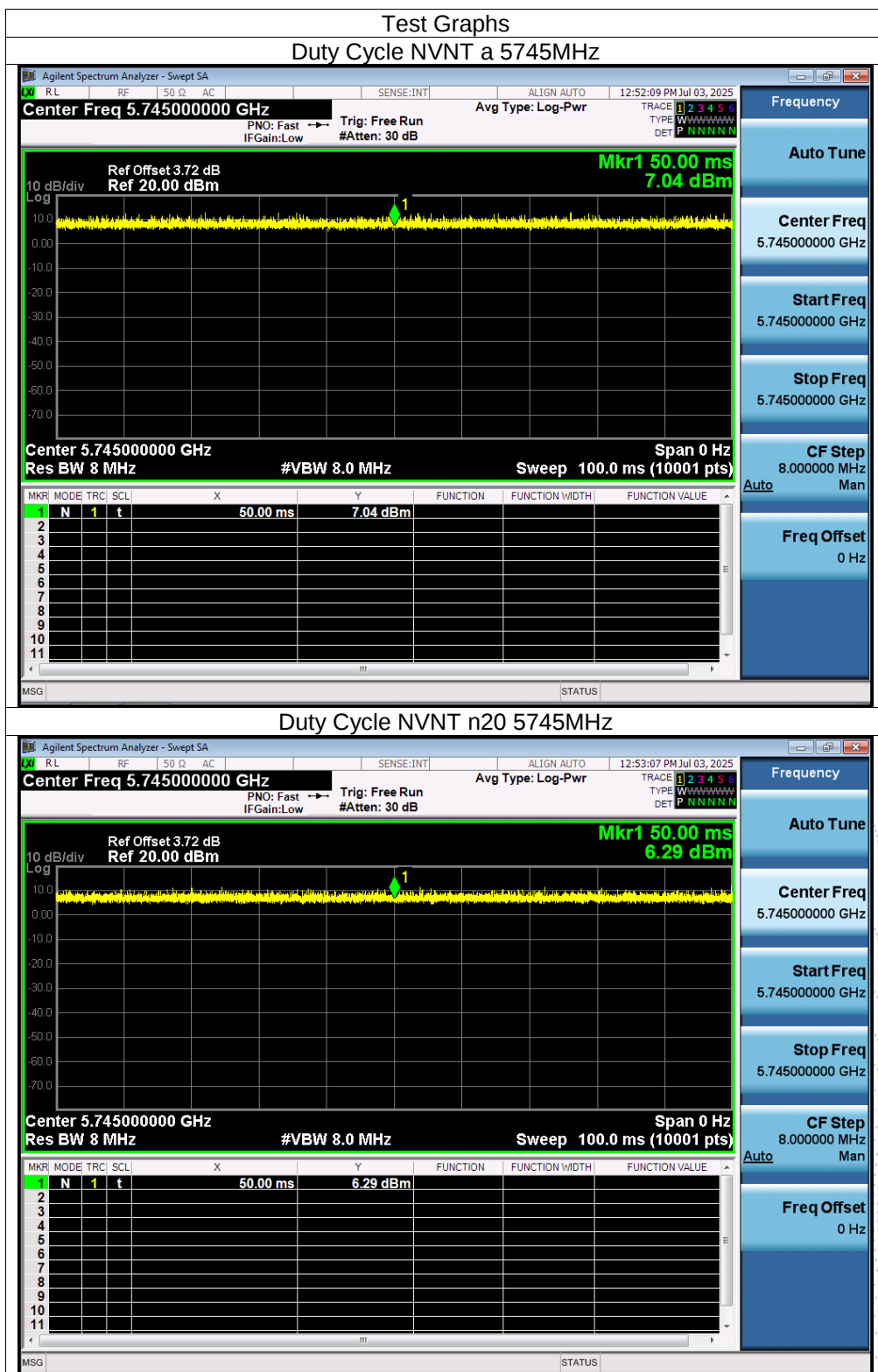


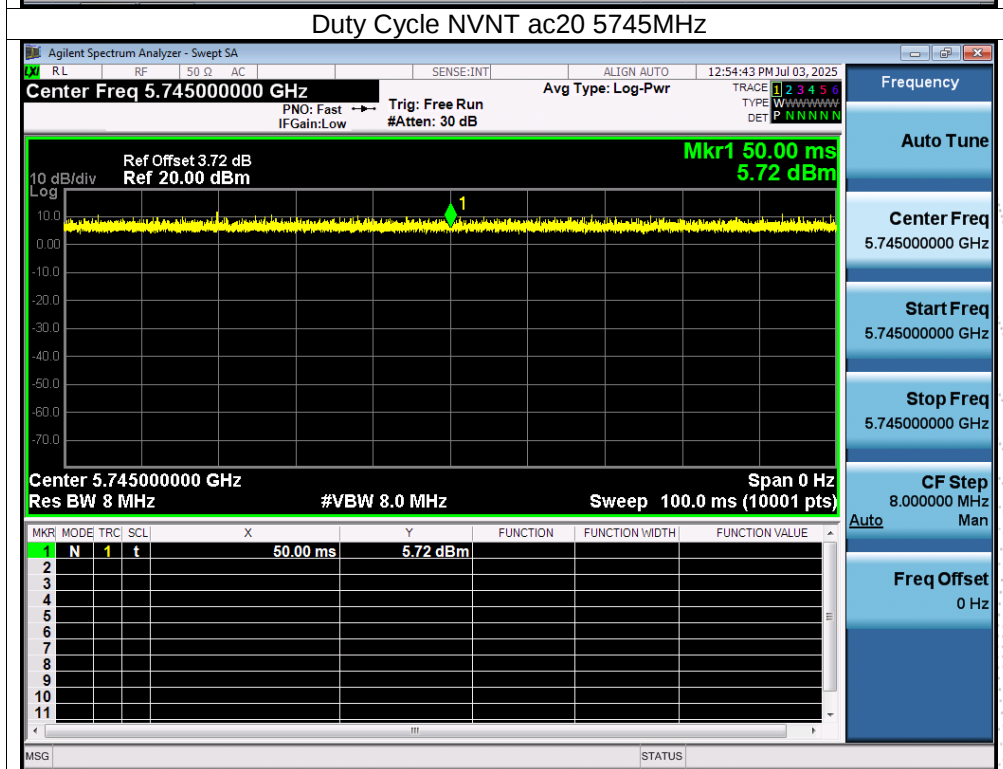
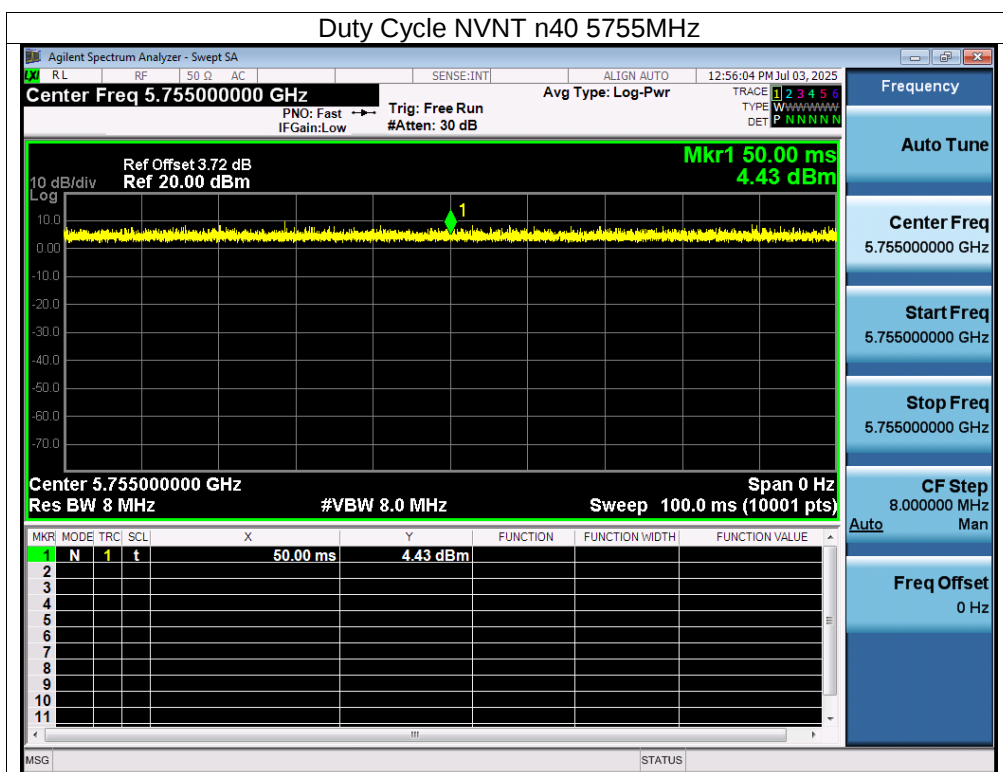


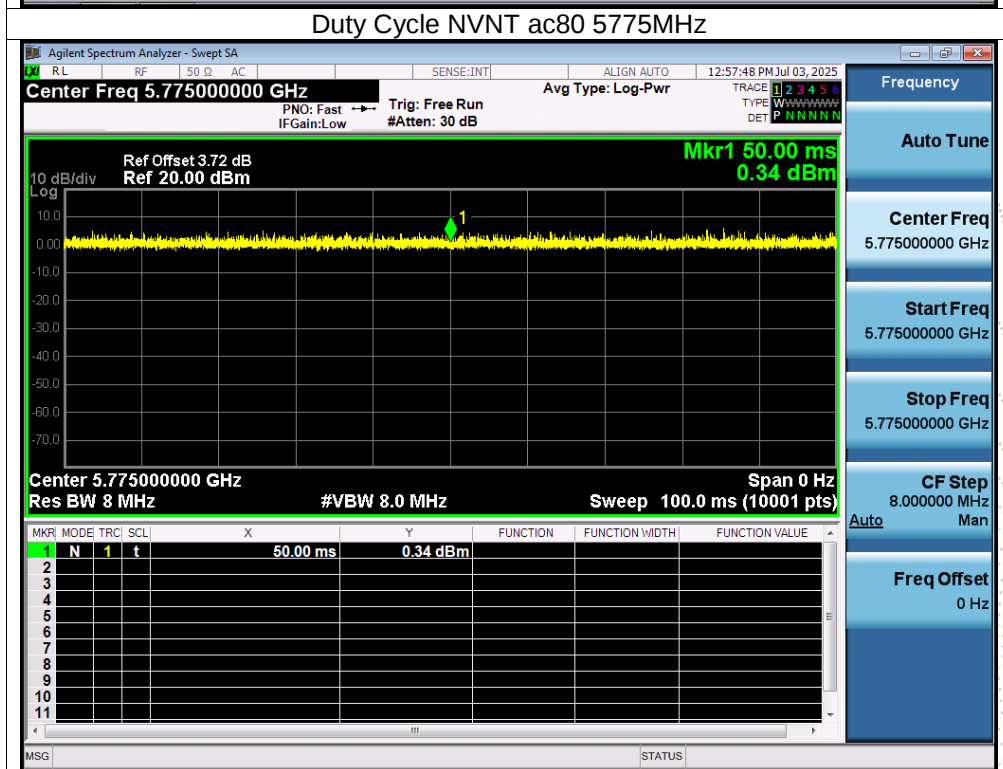
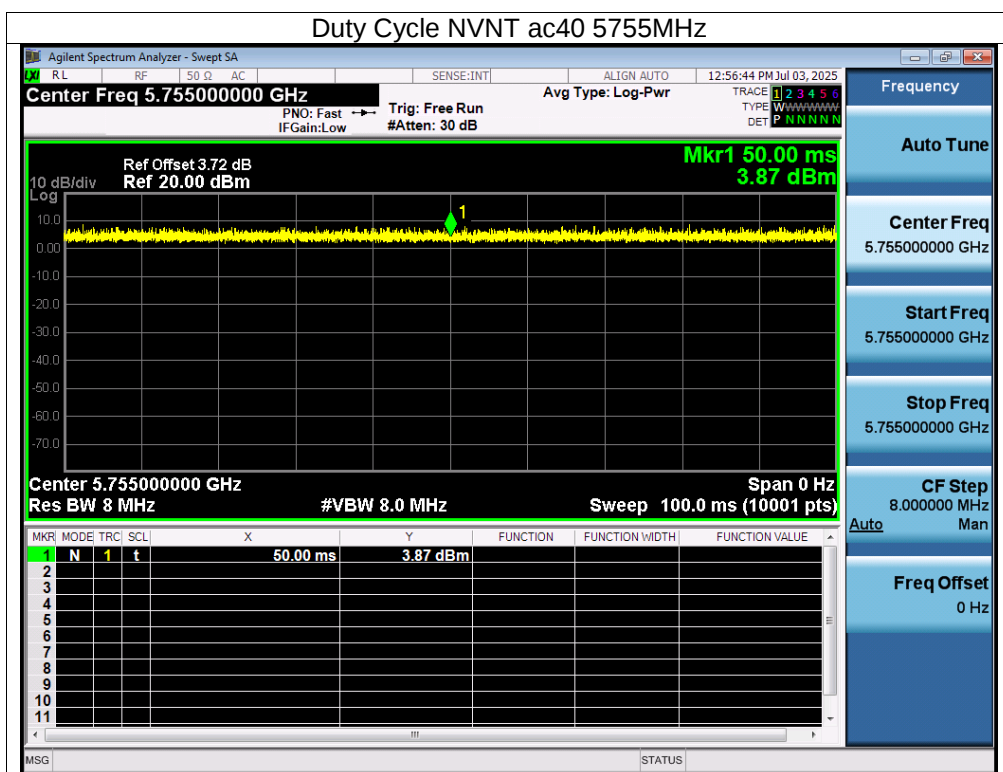
5.8G

| Condition | Mode | Frequency (MHz) | Duty Cycle (%) | Correction Factor (dB) |
|-----------|------|-----------------|----------------|------------------------|
| NVNT      | a    | 5745            | 100            | 0                      |
| NVNT      | n20  | 5745            | 100            | 0                      |
| NVNT      | n40  | 5755            | 100            | 0                      |
| NVNT      | ac20 | 5745            | 100            | 0                      |
| NVNT      | ac40 | 5755            | 100            | 0                      |
| NVNT      | ac80 | 5775            | 100            | 0                      |









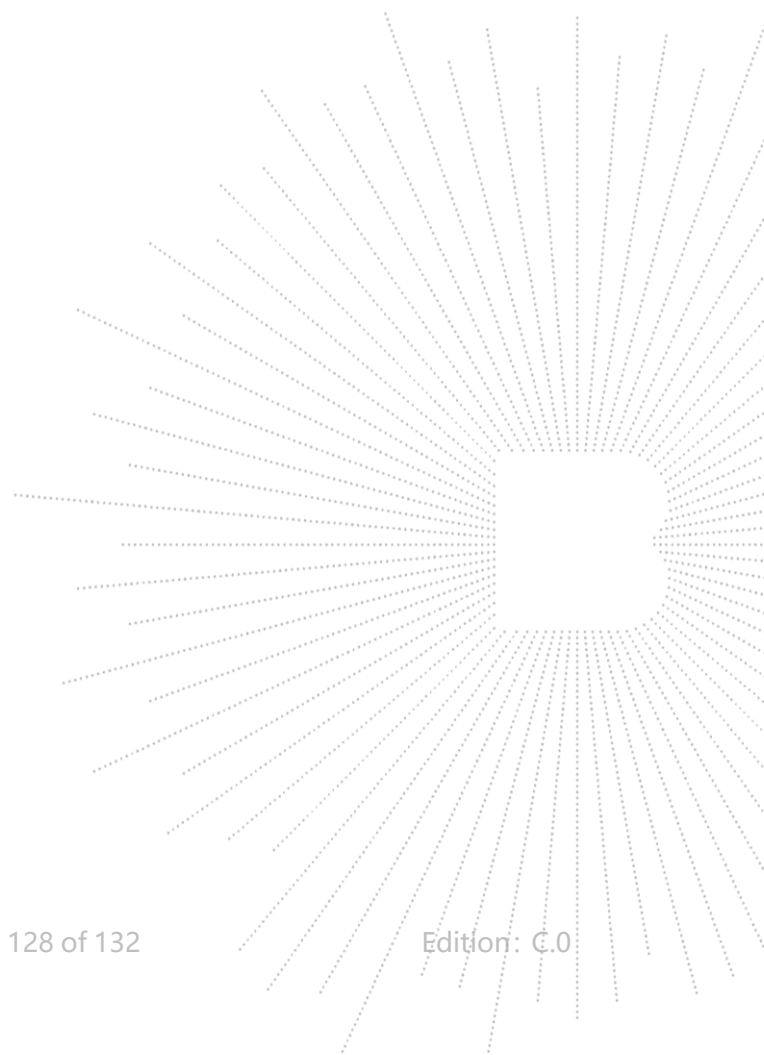
## 15. Antenna Requirement

### 15.1 Limit

15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

### 15.2 Test Result

The EUT antenna is Internal antenna (antenna gain: 1.8 dBi ). It comply with the standard requirement.

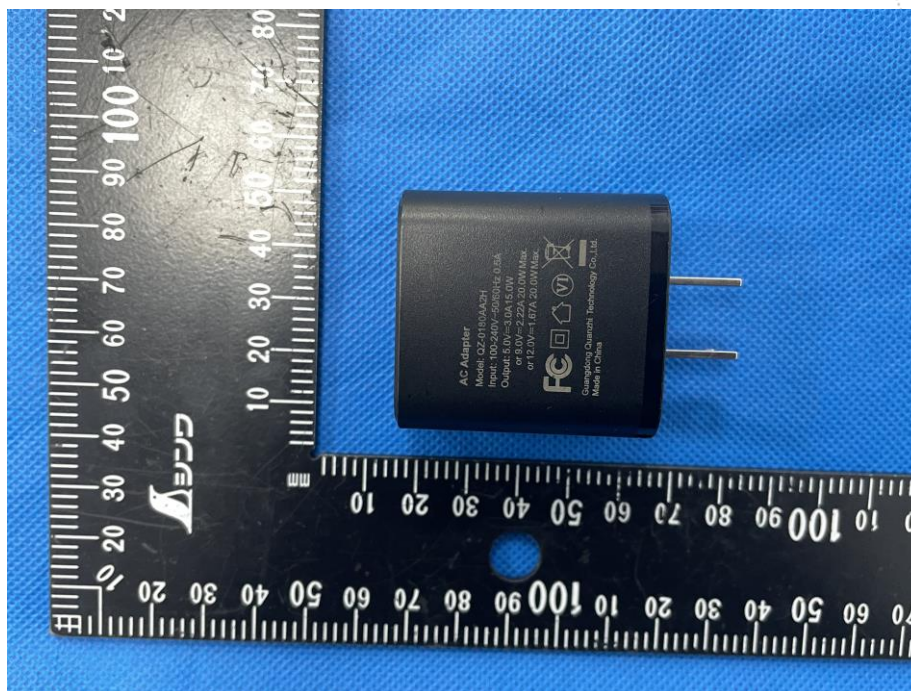


## 16. EUT Photographs

EUT Photo 1



EUT Photo 2



NOTE: Appendix-Photographs Of EUT Constructional Details.

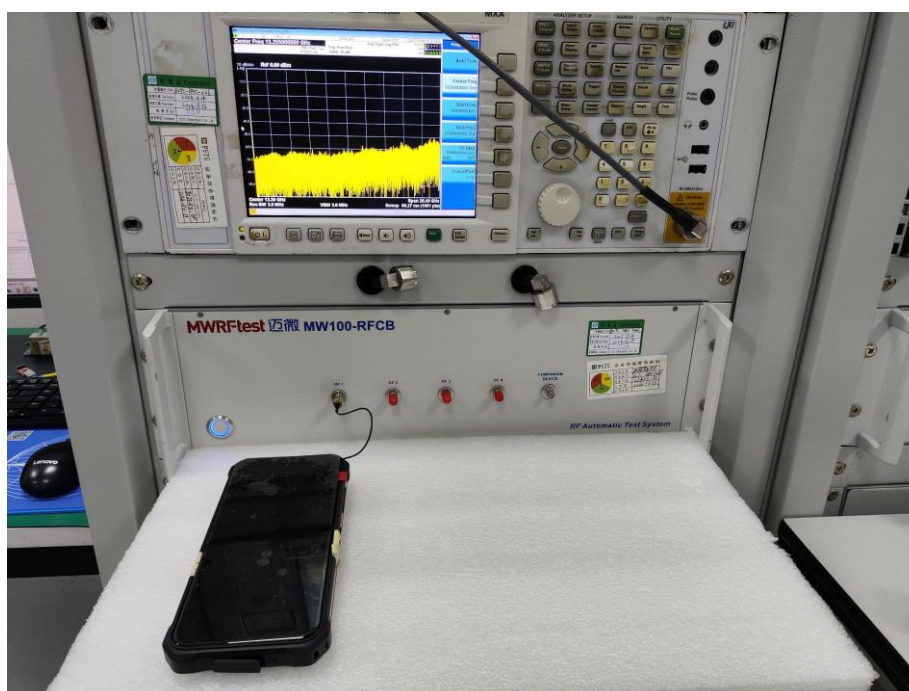
## 17. EUT Test Setup Photographs

### Conducted Measurement Photos



### Radiated Measurement Photos





## STATEMENT

1. The equipment lists are traceable to the national reference standards.
2. The test report can not be partially copied unless prior written approval is issued from our lab.
3. The test report is invalid without the "special seal for inspection and testing".
4. The test report is invalid without the signature of the approver.
5. The test process and test result is only related to the Unit Under Test.
6. Sample information is provided by the client and the laboratory is not responsible for its authenticity.
7. The quality system of our laboratory is in accordance with ISO/IEC17025.
8. If there is any objection to this test report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

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\*\*\*\*\* END \*\*\*\*\*